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Convenience
Total Traffic Circulation
Traffic: The Market Indicator
Expressways and Apartment Sites
The Visibility of Highway Markings
Transportation Progress in Philadelphia
Connecticut's New Provisional License
Revenue Bonds for Offstreet Parking
Guide to Transportation Planning
The Roadside Motel Industry
Atlanta's Parking Policy
Toll Road Financing

THE ENO FOUNDATION FOR HIGHWAY TRAFFIC CONTROL

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Traffic Quarterly

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Convenience

Convenience has been a major factor in the development and use of the motor car. Adding to this convenience was our vast net of highways and our constant planning for more.

With the coming of macadam, tarvia and concrete strips, the farm, factory and market came closer together. It has become a symbol of travel facility for pleasure or for work.

Thus, *convenience*, creating high car ownership and high daily use, served tremendously in lessening sectional differences, and in bringing greater appreciation of our national resources, our people, and our problems.

Today, no other form of personal travel is complete without the adjunct of the car for terminal use. And most forms of personal transportation feature convenience and comfort for the traveler, frequently to the extent of luxury and higher tariffs.

For heavier transport, there is the truck – also convenient. Without truck transportation for fast and frequent delivery, we would be constrained to reconstruct every form of business management and activity, to revise our commerce, our supply of daily essentials, our health and diet. Approximately 1700 communities have no railway facilities. Without motor transportation, their plight would be a catastrophe.

It would be unfortunate indeed therefore if, in further unifying our country with the projected Federal Highway System, any local pressures were to lessen the comfort of driving. Toll roads, generally considered the acme of highways today, have pretty well resisted local pressures. Provisions of high quality for gas, comfort, and repairs have been granted at appropriately spaced locations.

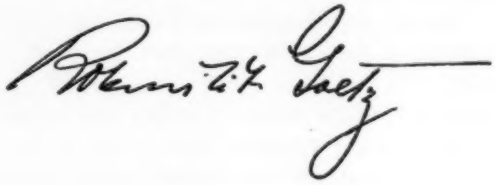
Such arrangements do not retard the flow of cars; signs several miles away inform drivers how soon they will reach the next oasis; and safety is not decreased by motorists frequently slowing up, turning off, parking. Every practical factor of motoring convenience should be protected against local pressure that would disregard the principle of "the greatest good for the greatest number."

Design standards, location, and protection of the right-of-way

for the planned Federal System lie in the hands of competent engineers. Unless unwarranted interference is permitted for local advantage, the new nationwide interstate highway will in construction be of highest order.

It is inconceivable that now, with the obvious success and advantage of toll roads, we would sanction the construction of a Federal Highway System far below the travel conveniences on those roads built twenty years ago.

It is hoped that we make certain, in building this great Federal System, that we use fully our past experience and our present knowledge. It is inconceivable that we should allow ourselves, in this time of automotive progress, to be influenced by selfish or unrelated interests.



A Total Traffic Circulation System

BRUCE CAMPBELL AND ROBERT C. BLUMENTHAL

Mr. Campbell worked on the Boston Expressway System before becoming Manager of the Massachusetts Safety Council, a position he still retains. In 1953, he and Mr. Blumenthal formed the partnership, Bruce Campbell and Associates. In this capacity they have done the highway planning and layout for the Metropolitan District Commission in Boston and similar work for cities, towns and private companies. Both are members of the Institute of Traffic Engineers.

Prior to the formation of Bruce Campbell and Associates, Mr. Blumenthal operated his own consulting engineering business in Boston. His work included highway planning and traffic analysis on expressways in Boston, Massachusetts and Providence and Pawtucket, Rhode Island, the Springfield Master Highway Plan, and many other projects. He received one of the major state awards presented by the General Motors Corporation for a paper entitled "How to Plan and Pay for the Safe and Adequate Highway System America Needs."

EXPRESSWAYS will only help, not solve, the traffic problem. A paragraph, which can be found in, or applied to, most master highway plans for large metropolitan areas, reads somewhat as follows:

"It would not be feasible to provide sufficient lanes in some sections of the expressway system to satisfy the volumes assigned to these sections for 1975. The existing street system must carry the excess traffic."

The "excess traffic" in 1975 – which must be carried by the existing street system or mass transit system, since it cannot be carried by the expressway system – has been estimated as greater than present-day volumes. Therefore, in 1975, with a complete expressway system, traffic conditions could be worse than they are today.

For example, the Central Artery section of Boston's Expressway system is six lanes wide. Its maximum possible capacity can be estimated at 120,000 vehicles per day when weaving and merging maneuvers from closely spaced ramps are considered. The volumes assigned to the Central Artery for 1975 are well in excess of 300,000

vehicles per day, on an automobile only plus existing transit basis.

Another factor for which a solution has not been developed is mass transit. As more vehicles appear on the highways, the patronage of mass transit declines. The construction of more expressways encourages more persons to change from mass transit to private passenger cars. And yet, one of the most important factors in solving traffic problems in 1975 and succeeding years is mass transit. It is possible that one result of the construction of expressways today – expressways which alone cannot solve the 1975 traffic problems – will be to cripple mass transit in the years between now and 1975 so that mass transit will not be in a position to help solve our 1975 problems.

A partial relief for this situation will be considered later. Unfortunately, very little work has been done on the interrelationships of various types of transportation or the effect they will have on each other in the future. Comprehensive planning studies are needed on this and related subjects. For instance, at what point will the provision of parking spaces in the central business district remove so much taxable property that the overall economy of the city will be undermined?

A Total Traffic Circulation System

Will we ever have a total traffic circulation system? The answer is: Yes, we can have a complete system, although it cannot be the perfect system we dream about.

The total traffic circulation system would consist of expressways in rural areas where high speeds and complete control of access are necessary; expressways in hard core urban areas where intense traffic concentrations indicate new right-of-way must be purchased; thoroughfares (semi-expressways) in areas where existing facilities can be greatly improved by modern traffic engineering techniques; mass transit effectively serving the central business district and used by commuters who are now all-day parkers.

The existing street system will be an important part of any total traffic circulation system. While ultimate development of existing streets would mean significant relief for today's traffic problems, it will be absolutely essential by 1975 to handle the excess traffic which cannot be handled by the expressway system.

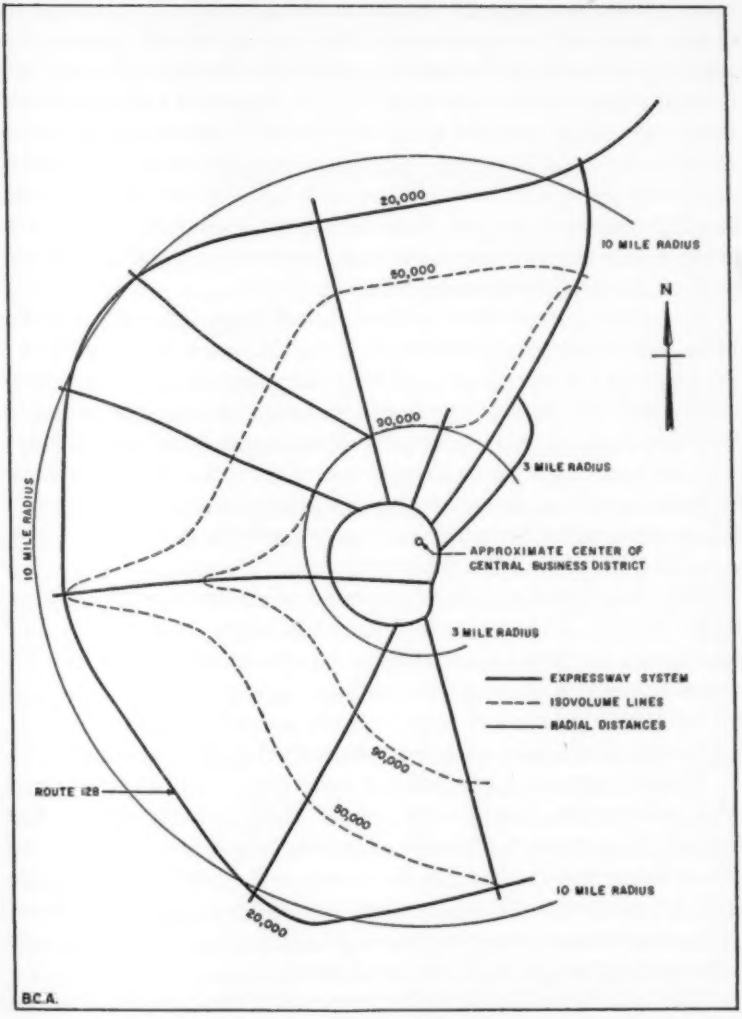


Figure 1. Schematic showing approximate expressway system and "isovolume" lines connecting points of equal volume as expected on arterial expressways in 1975 for Greater Boston.

Ultimate development of the existing street system would include: eliminating all curb parking; restricting left turns unless separate left turn lanes could be provided, allowing left turns only if intersection-capacity permitted; providing separate lanes for bus stops; providing medians where street-width permits; eliminating unnecessary crossovers and separating opposing traffic flows; channelization wherever necessary; modern signalization with volume-density control or flexible Barnes-type controllers, including progressive systems; and any other improvement to reduce interference with traffic movement to a minimum.

An arterial street that leads into a metropolitan area and has been developed to its maximum potential may be designated a thoroughfare. Generally, a thoroughfare would have signalized intersections at grade. An occasional overpass might be required, but, for the most part, widening of approaches at critical intersections would be used to develop increased capacity. Minor intersections would be eliminated by a continuous median, and intersecting streets would be treated as ramps at grade, with only right turns permitted on and off the thoroughfare.

The thoroughfare will be assumed as six lanes wide, three in each direction. Experience in Boston has shown that six-lane thoroughfares can handle as many as 90,000 vehicles per day. The argument in the past against the type of improvement suggested by the thoroughfare was that it would only eliminate one bottleneck, with traffic becoming more congested at the next bottleneck.

Traffic engineering techniques have improved in recent years. Also, politics does not play the role in highway improvement that it did in former years. Consideration formerly given to taxi stands, corner stores and the like, has given way to the need to move traffic. It will be easier to be more consistent in developing local streets to their maximum capacity, starting near the core of the large city and working toward and into the suburbs.

The number of bottlenecks decreases as the distance from the central business district increases. The map of isovolume lines (Figure 1) for the Greater Boston area in 1975 shows how the daily volumes generally decrease from 300,000 in the CBD to the 20,000-level at most points ten miles from the CBD.

There is a limit to the number of bottlenecks that can be ex-

pected and consistent improvement of existing streets will improve the overall circulation of traffic. It has already been pointed out that this improvement of existing streets will be needed along with the expressway system.

The Three-to-Ten-Mile Zone

Boston is used as an example in comparing expressways and thoroughfares. The results would be different for different cities and for each area the expressway or thoroughfare would serve, but the basic approach would be the same.

The isovolumes lines for Greater Boston denote that the point at which the 90,000-average daily volume is reached is approximately three miles from the center of the city. The 20,000-level is reached ten miles from the center of the city, except to the northeast, southeast and west.

Let us assume that, within the three-mile zone, the heavy traffic volumes require additional (new) streets, that the cross-movement of desires would create too many conflicts on improved streets at grade, and that circulation demands expressways. There would be exceptions, but a circumferential as economically close as possible to the CBD would appear essential, with feeder expressways to the three-mile zone. Possibly an intermediate circumferential would be needed also.

Again, at the ten-mile zone, a circumferential would appear essential for distribution of traffic with a destination near the ten-mile zone. This circumferential, which exists in Route 128, effectively removes traffic that would only add to the congestion within the ten-mile zone.

Beyond the ten-mile zone, expressways are also essential. High speeds are necessary for long trips. Control of access and proper design are necessary for safety at high speed, especially since three-fourths of the nation's highway deaths occur in rural areas. National defense is another factor demanding high-speed, limited-access highways beyond the ten-mile zone.

Therefore, let us make a comparison of cost, time and capacity-factors in the "three-to-ten-mile zone," the area where thoroughfares might most effectively compare with expressways.

Any comparison must be between facilities of equal capacity. An eight-lane expressway has a possible capacity of approximately 160,000 vehicles a day. A six-lane thoroughfare has a capacity of 90,000 vehicles a day.

Expressway and Thoroughfare Compared

It will therefore require two six-lane thoroughfares to equal the capacity of one eight-lane expressway. Expressways are constructed over almost entirely new right-of-way because of the width required. It is less costly than taking more expensive properties along existing routes, and leaves existing routes undisturbed to continue carrying traffic. It will be assumed that the existing route paralleled by the new expressway carries 20,000 vehicles a day. The total of 160,000 on the expressway plus 20,000 on the existing route is 180,000 vehicles a day, the total carried by two thoroughfares. Therefore, the two sets of facilities are of equal capacity (Table 1).

Many factors can greatly affect costs. A large building that must be razed can increase the cost of right-of-way. A poor soil condition, requiring a new drainage system, can increase construction costs.

It is difficult to assign a figure of $X million per mile as the cost of a highway. However, since there must be some basis of comparison, and since it is assumed that specific values will be used in applying the general theory being developed to every new route, approximate costs in the area north of Boston will be used.

In this area – which is well populated but still contains undeveloped areas – the cost of construction is estimated to average about $3 million a mile and the cost of right-of-way at $1 million a mile. The total is an estimated $4 million a mile. Costs will decrease as distance from the metropolitan city increases, but these averages will be used for the three-to-ten-mile zone.

The first thoroughfare will be developed along existing routes. Land takings will be required only at certain locations. These will usually be at major intersections where approach-widths must be increased to enlarge the capacity of the intersections.

The total costs, including land takings and construction, have been found to be approximately $750,000 a mile.

The second thoroughfare must be developed over some new

right-of-way. Since six lanes are involved as against eight on the expressway, and land takings for ramps are not required, it will be assumed that the right-of-way required is slightly less than two-thirds that of the expressway. A cost of $625,000 a mile has been assigned for right-of-way.

Since this is the approximate estimate of construction costs, the same value will be used, resulting in a total cost for the second thoroughfare of $1,250,000 per mile.

The second thoroughfare would be developed along minor streets and would serve to separate different land uses wherever possible so that the only desires to pass from one side to the other would be those of vehicles, not pedestrians. One possible method of

Table I

CAPACITY, COST, AND TRAVEL TIME FOR EXPRESSWAY AND THOROUGHFARE COMPARED

	EXPRESSWAY		*THOROUGHFARE*	
CAPACITY	*Expressway*	*Existing Route*	*Thoroughfare No. 1*	*Thoroughfare No. 2*
Average daily Traffic	160,000	20,000	90,000	90,000
TOTAL – Two Routes	180,000		180,000	
COST				
Construction per mile	3,000,000	—	—	625,000
Right of Way per mile	1,000,000	—	—	625,000
Total per mile	4,000,000	—	750,000	1,250,000
TOTAL – Two Routes per mile	$4,000,000 per mile		$2,000,000 per mile	
TOTAL COST – 7 miles	$28,000,000		$14,000,000	
TRAVEL TIME				
Peak Hour Speed	30 mph	15 mph	25 mph	25 mph
Avg. Delay at Traffic Signals	0	45 sec.	20 sec.	20 sec.
Travel Time for 7 Miles	14 min.	28 min.	16.8 min.	16.8 min.
Signal Delay Time (No. Signals)	0 (0)	15 min. (20)	4.7 min. (14)	4.7 min. (14)
TOTAL – Peak Hour	14 min.	43 min.	21.5 min.	21.5 min.
Off-Peak Hour Speed	55 mph	30 mph	45 mph	45 mph
Avg. Delay at Traffic Signals	0 (0)	30 sec. (20)	10 sec. (14)	10 sec. (14)
Travel Time for 7 Miles	7.7 min.	14 min.	9.4 min.	9.4 min.
Signal Delay Time (No. Signals)	0	10 min.	2.3 min.	2.3 min.
TOTAL – Off-Peak Hour	7.7 min.	24 min.	11.7 min.	11.7 min.

development, where necessary in built-up areas, would be to take one-half block on either side of an existing street (Figure 2). The rear of the remaining buildings would face on the thoroughfare and would not require access. Fences would protect pedestrians from the traffic. Cross-traffic would be restricted, with ramps at grade and bus stations incorporated into the design. Here again, individual design would be required, setting points of entrance and exit, and determining whether both or only one would be permitted.

The total cost of the two thoroughfares is estimated at $2 million a mile. The total cost of the expressway is $4 million a mile.

This means that the two thoroughfares have an equal traffic-carrying capacity to the expressway at only one-half the cost. While cost factors and estimates would have to be prepared for every route in every city, in this particular case the estimates have favored the expressway and it can be restated that the cost of the expressway compared to equivalent-capacity thoroughfares is at least two to one.

Travel Time and Dollar Savings

It is well established that, as volumes increase, speed decreases. Maximum theoretical capacity of approximately 2,300 passenger cars per lane per hour is developed between thirty and thirty-five miles per hour. Whether the lane under consideration is on an expressway, a thoroughfare or an existing city street makes little difference.

This means that speeds at peak hour will be approximately the same on expressways and thoroughfares, since interferences have been greatly reduced. Even where access is completely uncontrolled, it is very difficult for a vehicle to find a gap to enter the flow during peak hour. A speed of 30 MPH has been assigned to the expressway at maximum capacity, 25 MPH to the thoroughfare and 15 MPH to an existing route, before considering traffic signal delay.

The thoroughfares would have approximately fourteen traffic signals in the three-to-ten-mile zone; the existing route would have twenty traffic signals, and the expressway none. Thoroughfare signals would be progressive at all times and maximum green-time would be given during peak hours. Some vehicles would be fortunate enough to pass through a majority of the signals without delay before reaching their dispersing point, others would not.

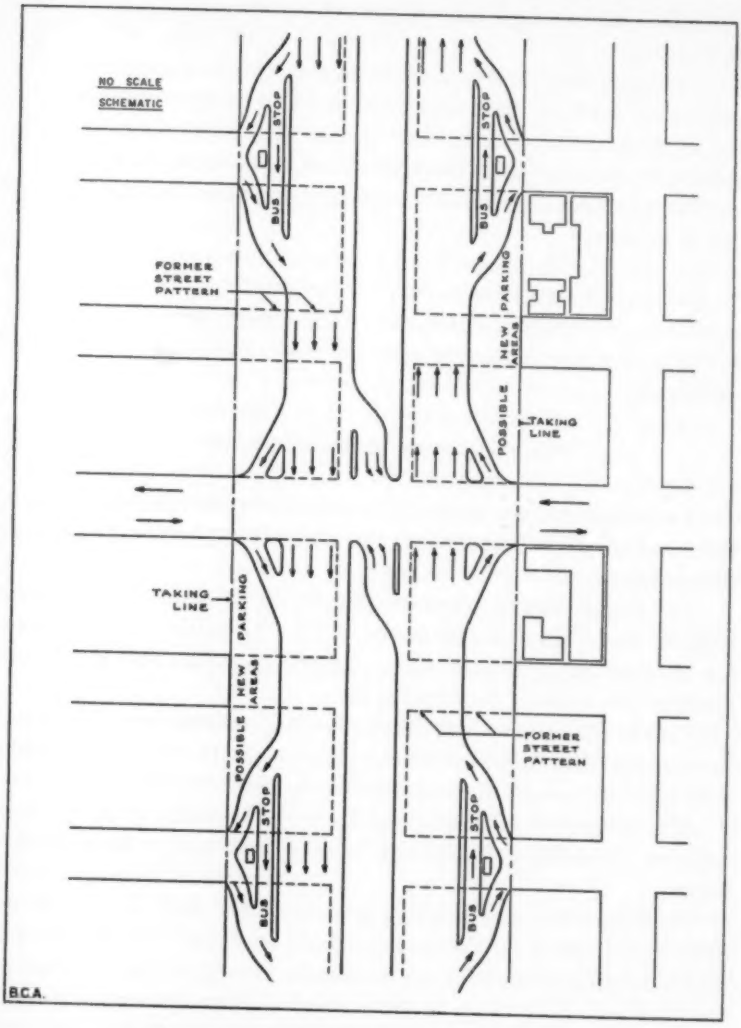


Figure 2. Typical Thoroughfare Pattern.

Therefore, an average delay of twenty seconds per signal has been assigned.

On an existing route, the maximum delay at signals where intersections have not been improved could be two or three full cycles. An average delay of forty-five seconds has been assigned for an estimated twenty signals through the three-to-ten-mile zone.

The peak hour travel times through the three-to-ten-mile zone are as follows:

Expressway	14 minutes
Existing route	43 minutes
Thoroughfares	21.5 minutes

By a similar process, the off-peak travel times can be estimated as follows:

Expressway	7.7 minutes
Existing route	24 minutes
Thoroughfares	11.7 minutes

These figures indicate that a thoroughfare can cut existing travel times in half, while expressways can reduce travel times to one-third of existing rates.

The travel-time figures show that, in the three-to-ten-mile zone, existing travel time can be cut in half for $2 million a mile. Then, for another $2 million a mile, the travel time can be reduced another one-sixth of the existing time.

This indicates very definite diminishing returns from the second investment of $2 million a mile and is a factor to be considered when attempting to establish a total traffic circulation system.

The next step usually taken by some highway planners is to estimate, in dollars, the savings in time, operating costs and accidents.

To determine time savings in dollars, the reduction in travel time is multiplied by the average daily traffic and by the days in the year, with a reduction for weekends. A wage factor of between one and two dollars an hour is then used to determine annual savings. By this method, it is not too difficult to show that the extra expenditure will pay for itself in ten years or so.

This type of reasoning overlooks several factors, not the least of which is that these savings can not be added to the next highway appropriation.

This estimated travel-time difference between the expressway

and the thoroughfares in the example used is seven and a half minutes during peak hours and four minutes during other hours, a weighted average per vehicle of about five and a half minutes. Any estimate of a wage factor or time losses in this case must be in terms of minutes to an individual, not hours to a great mass of people. Even the man who works for himself will take time out for a cup of coffee – which is about equal to the time savings of expressways over thoroughfares.

Furthermore, speed distribution curves show that only a minority of the drivers will drive at the posted speed limit, especially for short trips in urban areas. The five and a half minute average saving is for a seven-mile trip. The volumes decrease from 90,000 vehicles at a three-mile radius to 20,000 in most cases at a ten-mile radius.

It would appear that time savings in dollars are not realistic in estimating the value of expressways over thoroughfares.

Similarly, with long delays eliminated and with progressive traffic signal systems tending to reduce the number of extreme high and extreme low speed vehicles – making traffic flow almost continuously on thoroughfares – a great difference in operating costs does not exist between thoroughfares and expressways.

Comparative Safety of the Two Systems

A critical point in any consideration of this kind is the comparative safety of the two systems. Limited-access highways have a much lower accident rate than non-limited-access highways. The question is the relative safety of thoroughfares and expressways, or whether access is sufficiently limited on thoroughfares to approximate expressway safety.

Studies by the Massachusetts Safety Council revealed several very consistent factors with regard to accidents in the communities to be found in the three-to-ten-mile zone. These factors include:

one-third are rear end accidents
one-fourth are pedestrian accidents
one-fifth are angle accidents
one-half of the injured pedestrians are under ten years of age
two-thirds of the pedestrians are injured between intersections
one-ninth of the pedestrians are injured at intersections with no signal

The pedestrian statistics indicate that fences, proper design of medians, pedestrian overpasses, etc., can greatly reduce the danger of thoroughfares to pedestrians. The young pedestrians are injured primarily in their own neighborhoods, so that this group will not be seriously affected by a properly designed highway at grade.

Rear-end accidents are reduced by removing on-street parking and bus stops, by widening intersection approaches, eliminating median openings, the use of large signal heads, and other factors incorporated in thoroughfare design. Angle accidents are reduced by decreasing the number of intersections, complete signal control of all intersections, channelization to separate turning maneuvers, and other factors also incorporated in thoroughfare design.

With progressive signal systems tending to reduce the number of extreme high speed and extreme low speed vehicles – which can continue to operate independently on expressways – little difference would appear between the safety records of the two facilities. The age-old belief that traffic signals create more accidents than they prevent has been eliminated by modern, highly-developed signal installations.

Summary of Operational Factors

The operational factors of the expressway and thoroughfare can be summarized as follows:

Factor	*Expressway (8 lanes)*	vs.	*Two Thoroughfares (each 6 lanes)*
Capacity	180,000 per day		180,000 per day
Cost	$4 million per mile		$2 million per mile
Travel Time	¼ existing ($2 million more per mile than thoroughfare for ⅙ less time)		½ existing
Savings:			
Time	5.5 minutes average in 7 miles over thoroughfare		
Operating Costs	questionable		
Safety	questionable		
Construction Time	6–8 years		1–2 years

From this comparison, it is questionable how much additional benefit is obtained by spending twice as much for the expressway as for two thoroughfares. Perhaps the additional $2 million per mile would be better invested in still another thoroughfare.

Admittedly, the comparison is based on many assumptions.

These assumptions, while reasonable, could be weighted in one direction or the other. The fact remains that the comparison can be a very accurate one; if it is, it is questionable that expressways are the correct answer to the traffic problem in many areas.

A new estimate by the Bureau of Public Roads shows that the cost of the nation's expressway network has gone up $10 billion, or 37 percent, in only two years. At this rate, the actual cost of this network may well double before it is completed.

What can be done in this case? Thoroughfares may be the answer. This type of thinking is unpopular today, when everyone is talking in terms of expressways and 70-mile-per-hour design speeds. However, if we are ever to have a complete traffic circulation system, with reasonably efficient highways serving all sections of metropolitan areas in addition to the interstate network, we shall apparently have to compromise. The three-to-ten-mile zone, between the three-mile and ten-mile radius, would appear to be the best area – at least in the case of Greater Boston.

City Planning Considerations

Not only are we not sure of the impact of expressways today, we have no conception of the problems after 1975. Will expressways follow city planning, or does city planning follow expressways? Will the impact be permanent? How far into the suburbs will the impact extend?

The 1954 inner cordon count for Boston revealed that the number of persons entering and leaving by rapid transit had decreased by 8.9 percent; and by passenger cars had increased by 8.2 percent. Discounting pedestrians, the total entering and leaving by mass and individual transportation had dropped almost 40,000 between 1938 and 1954.

While almost all of the new population is settling in urban areas of 50,000 or more, it is settling farther from the center. Should expressways be built into the city to combat this trend? Will they actually accomplish this purpose or will they be only a wasted investment, especially if they aid in undermining the compactness of the city?

The expressway does not offer the flexibility of a thoroughfare.

Three or possibly four thoroughfares can be built for the cost of an expressway. If an expressway becomes overloaded, improvements are very costly. On the other hand, with three or four thoroughfares, the congested areas could be improved while the remainder would be unchanged. As conditions change after 1975, the right-of-way taken for the thoroughfares would be available for further highway development. By that time, other forms of transportation may be more important than at present.

Thoroughfares require considerably less time to build than expressways. A complete thoroughfare system might well indicate the direction city planning should take.

Thoroughfare thinking could be taken beyond the ten-mile radius in areas not near the interstate network. A thoroughfare could be incorporated into town planning where local distribution is the primary concern, yet an adequate route to the metropolitan center is desired.

As the thinking develops toward a combination of expressways, mass transit and thoroughfares, the problem of the central business district of the metropolitan city remains unanswered.

Expressways will not have the capacity to handle 1975 traffic. These will be expressways costing not $4 million a mile, but $10 million or more a mile. Thoroughfares in the CBD would not be practical. While the Metropolitan District Commission in Boston is developing some thoroughfares inside the three-mile radius, they will serve mainly for radial traffic. The thoroughfare lends itself to radial, arterial or circumferential traffic rather than to complicated cross-traffic movements.

The commuter has long been the subject of controversy. He insists on driving into the city, at a rate of 1.5 persons per car. He congests the highways at peak hours, requires a parking space where his car stays all day and generally pays twice as much for this convenience as he would for trips taking less time by mass transit. The commuter loses and mass transit loses. The mass transit right-of-way does not develop its maximum potential and the total circulation system loses.

The commuter shows resistance to the cost of mass transit. An increase from 10 to 15 cents, or 15 to 20 cents results in a drop in business. If the commuter leaves mass transit because of a price

increase, perhaps he would return if his ride were subsidized. Resistance to even a 25 cent parking fee at stations on mass transit lines is witnessed by considerable cheating in the form of illegal parking. Every vacant lot and back alley is filled with persons risking towing or damage to a $4,000 vehicle in order to save twenty-five cents.

Suppose that the mass transit line were subsidized from the three-mile radius. Parking lots would be built in open areas outside the three-mile radius. The driver would buy a ticket from the attendant entitling him to a one-way trip. The driver would pay for the return trip plus a small amount for parking, the total to be less than the cost of two mass transit rides. Tickets would be available from 7–9 A.M. Buses would pick up drivers at the parking lot and take them into the city or to a rapid transit line.

The result would not be as big a loss to the transit system as a first glance might indicate. In fact, a great many more trips would be developed for mass transit since the driver would be taking a return trip. Also, some persons who were passengers before this system started would become transit riders shortly afterward.

To estimate actual costs, it will be assumed that the regular drivers plus those induced into the new system would equal all vehicles now entering the inner cordon between 7–9 A.M. In 1954, this total was 26,000 passenger vehicles. If each vehicle were subsidized thirty cents, the cost would be $7,800 a day. If applied only Monday through Friday, the yearly cost would be approximately $2 million dollars.

This money would be taken from the highway fund and turned over to the mass transit authority. The total number using this plan could be controlled by controlling the amount of the subsidization. This plan would at least appear to be a means for reducing the 7–9 A.M. and 4–6 P.M. peaks in traffic volumes caused by commuters, that result in congestion or even complete stagnation. In 1954 in Boston, the 4–6 P.M. peak hours for passenger cars exceeded the 3–4 P.M. plus 6–7 P.M. totals by 10,300 vehicles. At thirty cents each, this excess would equal a yearly cost of $800,000.

It is apparent that some drastic steps must be taken to support mass transit now so that it will be available to assist in the total circulation problems after 1975.

Expressways are not the complete solution to the traffic problem, today or in 1975. Two six-lane thoroughfares have the equal traffic-carrying capacity of an eight-lane expressway while costing only one-half as much, in the examples used. This applies to the area between the three-mile radius and the ten-mile radius from the center of the metropolitan city. These figures are based on greatly improved techniques that have been developed for traffic signalization, channelization and other traffic engineering improvements.

The extra benefits of an expressway over a thoroughfare, warranting twice as much expenditure, are not readily apparent, either from a traffic service or city planning viewpoint.

Developing a System Within Reach

Expressways are essential inside that hard-core area where cross-traffic desires may make thoroughfares impractical in most cases. Expressways are also necessary outside the ten-mile radius where high speeds and long trips prevail.

Even if an expressway system is completed, it will not be able to handle traffic after 1975. Since a second expressway system would probably be financially impossible, a thoroughfare system would be the only alternative.

A complete expressway system will not be a total traffic circulation system, even if finished. Estimates show that the cost of the 41,000-mile interstate expressway network has increased 37 percent in two years. It may be financially impossible to have even a complete expressway system.

A total traffic circulation system will include: Expressways where the cost of thoroughfares would approach the cost of expressways; thoroughfares where the benefits of expressways are only slightly greater and the cost much greater; mass transit within the hard-core metropolitan area.

At one time, the three considerations in natural order in building a highway were (1) politics, (2) finances, (3) the highway. Politics has been almost eliminated, but financial considerations will never be eliminated. If we do not compromise at some point, we shall never have a total system. Financial considerations indicate we must compromise.

Improved traffic engineering techniques make the compromise much less distasteful than it formerly would have been. In fact, the authors believe that three or four thoroughfares instead of one expressway may not be a compromise in the long run.

Not too many years ago, our highway thinking was not broad enough. Our predictions for the future fell far short of today's volumes and we underestimated the scope of the traffic problem. Determined not to make the same mistake again, our thinking would now appear to be too grandiose. We want every road to be an expressway, but this is neither possible nor necessary. Our problem is to keep traffic moving, but more than that, it is to move people. One way to keep abreast of the problem and to obtain a clear picture of where we are headed is to develop the total traffic circulation system that is within our reach.

The Progress of Transportation in The Philadelphia Region

JOHN A. BAILEY AND JOHN RANNELLS

Mr. Bailey is presently Executive Director of the Urban Traffic and Transportation Board and Deputy Managing Director for the City of Philadelphia. Mr. Bailey has had progressively important staff and line positions in Philadelphia since 1953 and before that was manager of several small Pennsylvania communities. He is a member of the Society for Advancement of Management, American Society for Public Administration, and the International City Managers' Association, among others, and is also on Governor Leader's Committee on Urban Mass Transportation. He is on the Board of University Settlements and is a registered engineer in Pennsylvania.

Mr. Rannells is Assistant Executive Director of the Urban Traffic and Transportation Board of the City of Philadelphia. He is a member of the American Society of Civil Engineers and an Associate member of the American Institute of Architects.

PHILADELPHIA, more than most cities in this country, is dependent on a mass-transportation system for movement of a substantial percentage of workers at peak hours. Its outmoded street system, laid out on a grid basis with narrow rights-of-way and narrow cart ways, dates back to the early days of William Penn. The growth of automobile ownership and the attendant street-parking of many vehicles further reduced the capacity of the street system, while that self-same automobile ownership rapidly increased the demand for street capacity.

Because of lack of differentiation in neighborhoods and a general lack of any coherent pattern of wider arterial streets, the city had to start nearly from scratch to determine an adequate system of trafficways. Meanwhile, the excellent rail commuter network – one of the best in the country, with nine radiating lines on the Pennsylvania side of the Delaware River – has declined in use on the whole, although growing moderately in the case of a few well-situated lines. Equipment is generally old and neither as comfortable nor as economical in operation as is available today.

Most of the newer residents live too far from the rail lines to walk and no feeder transportation system has been developed. Once the commuter buys the second automobile he tends to drive to his place of work, rather than park at the station; and even if he wishes to park space is inadequate in most cases for those who use the peak commuting trains.

In addition to the commuter railroads, the city's mass-transit system of subway and elevated lines serves several of the most densely populated areas and connects with downtown Camden, New Jersey, directly across the Delaware River from downtown Philadelphia. However, most of the rolling stock is old and costly to maintain, and the stations are run-down and inconvenient, with long flights of steps to climb.

The company which operates this system (much of which is city-owned) also runs the remainder of the surface system and is busily involved in converting most of its very extensive street-railway lines to bus operations. This conversion proved an advantage in some sections of the city, particularly in the outskirts where added street capacity became available as a consequence; but it caused protests from those who lost their nearby lines and were therefore required to walk farther to a transportation stop. Many of the patrons now drive their automobiles to work and thus have intensified street congestion. At the same time, the extra buses needed to replace the streetcars have created congestion, especially in the city center.

What, then, has the city done to counteract some of these situations, to overcome the deficiencies, and to find solutions to what is obviously an increasing problem?

Planning Commission Studies

Philadelphia, in the early forties, reactivated and strengthened its city planning commission, and for nearly fifteen years now a highly qualified professional staff has completed either by itself or through consultants, many basic studies necessary for sound planning decisions. Among these were studies for better use of railroad facilities, made in 1946 and for regional highways, in 1951. However, it has not yet been possible to make transportation decisions on other than the promotion of single major projects.

The city's first controlled-access expressway, the Schuylkill Expressway, is a connection to the Pennsylvania Turnpike, but it will not be completed until 1960. The Delaware Expressway, extending along the Delaware River from the south end of the city to the far northeast, has been proposed, discussed, and consultants have made three major studies; yet only now has it reached the place where actual design is under way. It will be several years before the first construction will be started.

In 1953, it became apparent to the mayor – who is now U.S. Senator Joseph S. Clark, Jr. – that effective action had to be taken to improve transportation to provide continued vitality for our city as well as jobs for our residents, or else fall behind in what we conceive to be a national economic race among metropolitan areas. This realization was part of the upsurge that brought about a new charter and new administration in 1952, in contrast with a former regime which never questioned the old ways of doing (or rather, in Philadelphia, of not doing) things.

In December, 1953, the city council created the Urban Traffic and Transportation Board as an advisory board to the mayor's office. The council charged this board to study the existing problems of traffic and transportation in the city, to make reports and recommendations from time to time; to provide a sound, workable traffic and transportation program which would consider governmental administrative organization, financial factors, use of existing transportation facilities, future planning for additions and extensions – and integrate this plan into the city's physical development program, together with the inter-county and inter-state co-operation which might be necessary to carry such a plan into effect.

The mayor appointed key leaders who had vested interest in the city's transportation system: presidents of the railroad and transportation companies, key members of the city's financial community, representatives of the automobile clubs, real estate and commercial interests. These men were all independent in the sense that they were not active members of party organizations, nor of the government. The chairman was an outstanding business man.

The work of the board was done under the direction of Robert B. Mitchell by a very small staff and a number of skilled consultants. Board members and other leading citizens with specialized knowl-

edge contributed actively toward the board's findings through "task forces" dealing with transportation technology, finance and administration.

No fine degree of detail was attempted because a picture of the whole problem was desired, to determine and illustrate major relationships. The board agreed early on a first general principle: that the problem cannot be solved just in Philadelphia; the origins of congestion are both inside and outside the city; all parts of the region are interdependent. The second general principle on which the board agreed was that all forms of transportation must be dealt with together and that not only the movement of people must be considered but the movement of goods as well.

The board's findings are embodied in its *Plan and Program 1955*,[1] consisting of "Conclusions and Recommendations of the Board" followed by a "Report of Staff" on which the conclusions and recommendations were based. Work of the staff, consultants and task forces was reviewed carefully by the board but the conclusions and recommendations were drawn up by the board itself, and endorsed by all members. Thus they carry the weight of industry leaders and other interested parties. Key statements by the board are listed below, from *Plan and Program 1955*:

1. The Problem

The Philadelphia region is becoming mired in a traffic problem so intense that the region's livability, its efficient functioning and its competitive power to attract population and industry are all seriously impaired.

Our streets and highways are clogged by today's traffic; our public transportation system has not been able to keep its riders; and unless heroic measures are taken, the future will bring greatly intensified congestion....

The area's population growth, combined with higher income levels, employment, and automobile ownership, will create heavy demands for all types of transportation....

Future demands, added to present requirements for modern-

1 Copies are available from the Urban Traffic and Transportation Board, Market Street National Bank Building, Philadelphia 7, Pa.

ization, call for an extensive program of new rapid transit and surface transit facilities, express highways and other arterial roads, and parking space planned on a region-wide basis. At the same time, common prudence requires that we make the most effective and efficient use of the facilities we have....

Arriving at the right balance between automobile driving and public transit riding is the crucial task if we are to make the most effective use of present streets and of expensive facilities to be built....

Nothing short of a complete evaluation of existing transportation facilities and services in the entire region and a reappraisal of current policies can answer the challenge that confronts the Philadelphia region today....

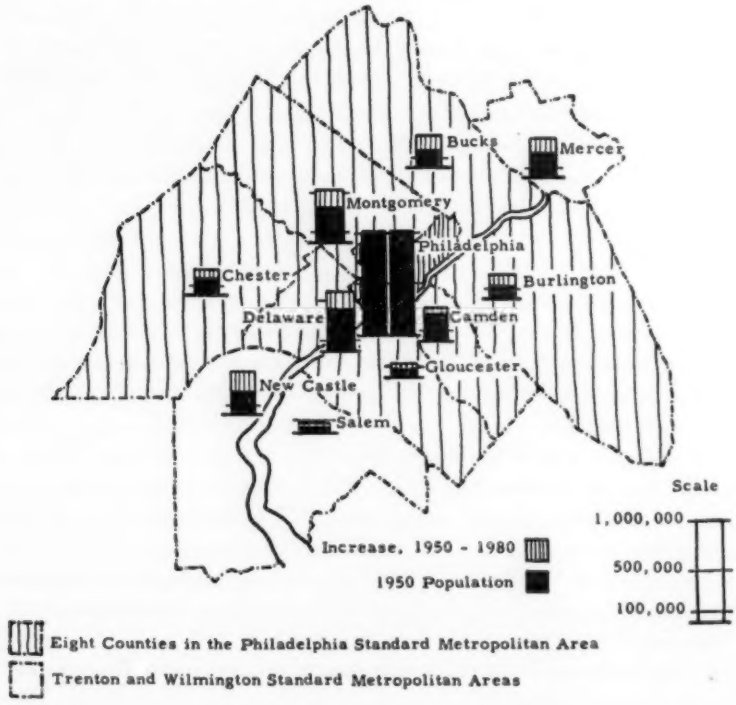


Figure 1.

Population in the Philadelphia Region, 1950–1980.

The central business district of Philadelphia is the heart of the region and the major focus of regional traffic flows.

This is the area where an effective balance between the flexibility of the private automobile and the superior efficiency of public transit must be struck. This balance in turn will determine the future nature of the transportation system.

2. Transportation in the Central Business District

The most important measure to reduce congestion in the central district is the construction of an expressway loop around the district. This will not only distribute traffic to all points in and near the center, with minimum use of local streets, it will permit through-traffic to pass freely around the center. . . .

In the field of mass transit, the board's plans also call for extensive and in some cases drastic overhaul of existing facilities serving the central business district. Surface transit in the central area, which moves at least five times as many passengers per lane as private automobiles during the peak periods, must be speeded up by reserving adequate downtown street space for the exclusive use of public transit vehicles particularly at peak hours.

Downtown parking and stopping restrictions must be strictly enforced.

A special study should be made of central district delivery problems, and of goods terminals throughout the city. Truck deliveries may have to be restricted at critical locations, especially during peak traffic hours.

A special study should also be made of the possibility of staggering working hours, on the effects of such a shift on both business establishments and employees, and on the possible effectiveness of such a program in reducing peak-hour congestion. . . .

Pedestrian movement is numerically the most important in the central business district and must be provided for in plans for facilitating central district traffic. . . .

3. Trafficways for the Region

An integrated system of trafficways covering the city and region will be required to convey the burden of all vehicle trips more than

a mile in length and to remove through-traffic from residential neighborhoods....

Three hundred miles of new expressways will be required in and around Philadelphia to meet future needs. To supplement the expressway system, at least 400 miles of arterial highways are needed and should be developed jointly with the expressway program in an articulated system of trafficways....

To make this program an eventual possibility at the lowest possible cost, rights of way for needed expressways and arterial highways in undeveloped or changing areas should be reserved as soon as possible....

Parking facilities also must be considered as an essential part of the automobile transportation system. Charges for both street and off-street parking must be related to achieve overall transportation objectives....

4. Improving Mass Transportation

Public transit is essential to alleviating highway congestion. Even taking for granted a vigorous program of expressway and parking

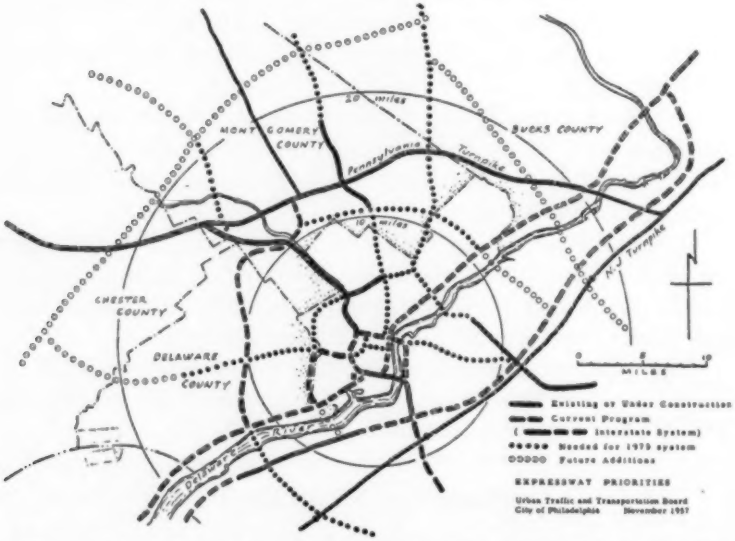


Figure 2. Existing and proposed expressway systems within ten and twenty miles of Philadelphia's central business district.

construction, mass transit of high quality is still required to accommodate the heavy proportion of trips to and from the central business district.

Surface transit routes, serving the dense urban areas near the central business district or feeding rapid transit lines, should be improved. Routes must be consolidated and co-ordinated to function as an integral part of a regional transit system. Service out to three to five miles should be oriented toward the central business district, and lines farther out should feed rapid transit....

Urban rapid transit of high quality is essential to serve the growing outer urban areas, five to ten miles from city hall....

Suburban rapid transit service now rendered by the railroads must be improved to meet the demands of growing suburban areas, ten to twenty miles from city hall....

Finally, and by no means least important, all public transportation services in the region which feed passengers to each other, or between which there is a possibility of exchange of a significant number of passengers, should be integrated into a transportation system offering co-ordinated schedules....

5. Problems of Finance

The problem is largely financial. Much larger sums will have to be invested each year than in the past to catch up with accumulated deficiencies and to build the transportation system we need. Current estimates place the cost of a modern transportation system for the entire area at $1.6 billion in new capital outlays.

The Philadelphia region can afford this outlay for an adequate and efficient transportation system. Current expenditures for all forms of local transportation services are about $1.4 billion per year, including $117 million for public transportation, $843 million for the ownership and operation of automobiles, and $440 million for truck ownership and operation....

This huge annual expenditure does not buy good and efficient transportation service because too much is being spent for the operation of vehicles and too little for the facilities on which effective and economical operation is possible. The high costs of congestion now being incurred because of poor transport facilities warrant a substantial increase in the proportion of total transportation

expenditures allocated to basic facilities. The board is convinced that it is false economy for the community, the transport user, and the industry to attempt to provide needed mobility with antiquated mass transportation equipment and obsolete highways....

Two major and related financial policies are recommended: (1) self-support of the transportation system as a whole and (2) establishment of a necessary balance among capital investments for the various segments of the system – particularly between highway and transit facilities. About $1 billion will be needed for expressways and major arteries for the five Pennsylvania counties to achieve the plan recommended by the board....

Parking facilities are an essential part of the automobile transportation system, and charges for both street and off-street parking must be correlated to achieve overall transportation objectives....

The maintenance of an adequate and improved public transportation system presents difficult financial problems in the face of declining patronage, obsolete equipment and rising costs of transit operation. Very considerable savings in expense and some increases in revenue should accompany extensive replanning and rehabilitation of the transit system....

A substantial part of the capital costs of rehabilitation for rapid transit may have to be borne by a sharing of revenues from other parts of the total, integrated transportation system. The public also must assume financial responsibility for the cost of improvements and extensions of railroad commuter service that cannot be covered by revenues, but which reduce the need for other public expenditures.... A public source of funds will probably have to provide credit for most of the large required transit investment.

6. Regional Administration

The problem is also governmental. There is now no administrative machinery for tackling the regional transportation problem on an integrated basis; and even within the city, responsibilities are diffused and a consistent policy is difficult to achieve. Satisfactory standards of mobility for those who live and do business in the area demand extraordinary measures to stop the dangerous drift that present public policy has been unable to halt.

The truly regional transportation system – the only adequate

cure for this chaotic situation – can be developed only when there is an organizational structure able to undertake the job. How that structure should be set up and function is discussed in a succeeding section....

The board recommends, as the only logical means of relieving the situation outlined in preceding sections and implementing the broad solutions proposed therein, that a regional transportation organization be created as soon as possible to develop a comprehensive transportation system. The regional agency should be vested with the powers necessary to effectuate a regional transportation program....

Its structure should be such that it would be consistent with a later enlargement into a multi-purpose agency. It should be established in a manner which will not require any changes in the existing political structure of the counties or their constituent municipalities....

The regional agency should be directed by a council which is truly representative of the people and the localities of the region. At least a majority of the members of this body should be elected directly by the voters of the area.

There must be a competent, well paid executive organization, responsible only to the council, and vested with the authority and resources necessary to carry out the council's policies.

7. Administration in the City

Coincidentally with the creation of the Regional Transportation Organization, or in the interim before a regional transportation agency can be set up, the City of Philadelphia must face a number of urgent problems and establish the necessary administrative machinery to deal with them....The Urban Traffic and Transportation Board should be reconstituted on a continuing basis as an advisory board in the office of the mayor....The city government should try to accomplish, within its own powers, as many as possible of the objectives of regional organization during an interim period before that organization can be established.

The Report of Staff to the Board, which supports and extends these conclusions and recommendations, is conceived as a working

partnership between sound theory and practical application. In this context, transportation is seen as the key to growth of the entire region and to the internal development of its various parts. Armed with knowledge of the region's present and future needs, it will be possible to use transportation planning as a tool for moulding the kind of city and metropolitan area most conducive to both social and economic well-being.

Having accomplished the first phase of the task assigned to it – "to arrive at an understanding of the major problems of Philadelphia and its metropolitan area in the fields of traffic and transportation and to recommend the policies to be followed and the general nature of a plan and program to implement those policies in both the short and long run" – the twenty-man board appointed by the mayor suggested a means of continuing its work through a reconstituted board close to the city administration (using several ex officio members from both the administration and the city council).

The present board, consisting of city officials and members of the business community, was appointed early in 1956, under the chairmanship of Charles H. Frazier, executive engineer of the Philadelphia Gas Works Company and a member of the original board. The mayor charged the new board "...to advise me and the managing director on methods of implementing the report which your predecessors have submitted; on its adjustment and modification to fit the rapidly developing situation and the pressures pro and con which can be expected as our citizenry digests and accepts these recommendations. You should keep the needs of all the citizens and businesses of this vast political and economic region before you in helping to guide, through your advice, the actions taken by my administration."

In addition, the mayor specified that the board was to carry on the uncompleted assignments of the preceding board; to continue studies of projection of population and employment and assignments of traffic to proposed highways; to assist in formulating policies for the guidance of public and private transportation interests, and in obtaining legislative approval of recommended policies; and to develop communications between the city council, city administrative officers, and the citizens and businesses of Philadelphia and its region.

Thus the board continues to stress long-range goals, but also shares many of the day-to-day concerns of the city's operating departments, the city planning commission, the parking authority, and others.

Implementing the Recommendations

There has been steady, although gradual, progress toward implementation of the conclusions and recommendations contained in *Plan and Program 1955*. The board's small staff has continued to play a key role in planning a system of trafficways to serve the region, in developing effective liaison among city departments, and in carrying on research to support the city's position with regard to transit improvements.

A major effort has gone into organizing a transportation study for the entire metropolitan area, under joint auspices of the two state highway departments, the Bureau of Public Roads and the local governments. At the end of 1957, this study appeared definite, with all parties agreeing to the need for it and ready to finance it. A ten-party agreement (among the eight counties of the Philadelphia-Camden Metropolitan Area and the two highway departments) is in near-final-draft form.

Early support for this study came from the Pennsylvania Department of Highways. To simplify administrative details, this department will continue to take the lead and will probably employ the study director, with the concurrence of the New Jersey State Highway Department, the Bureau of Public Roads, and the other parties.

Preparation of an unusually comprehensive preliminary outline of the proposed study has aided greatly in bringing it into being. The outline was developed during the summer of 1957 by a technical committee representing the various parties concerned: the highway planning engineers of both states; engineers from both districts of the Bureau of Public Roads and the Washington office as well; engineers from suburban counties in both states, and the senior author, representing the City of Philadelphia. A condensed version of the outline, omitting time schedule and budget, follows on the next page.

Condensed Outline of Proposed Transportation Study for the Philadelphia–Camden Metropolitan Area

I. OBJECTIVE . . . To establish a transportation planning process which will yield these results:

A. The current facts about all transportation facilities and services in the region as they affect highways:
. . nature, capacities and deficiencies of all transportation facilities and services . . characteristics of all travel in the region . . population, economy, and land use in the region as they affect travel patterns . . financial and governmental responsibilities as they affect transportation facilities and services.

B. Program of immediately needed and achievable adjustments to the present transportation system of the region.

C. Projections of items listed under "A" to 1975 and 1985 and assignment of projected travel to alternative systems of transportation facilities and services for these dates.

D. Comparison of relative costs and relative benefits of those alternative schemes, and of individual projects.

E. A co-ordinated transportation plan which will meet the anticipated 1975 and 1985 needs most satisfactorily and with the most economical use of highway funds, and which will promote a desired pattern of regional development.

F. A program for construction of transportation facilities and for changes in transportation services, to be based on priority of need and availability of funds so that each project results in a workable interim system.

G. Financial, organizational and legal implications of plans and programs offered to meet the 1975 and 1985 needs.

H. Provision for keeping the records of current facts up to date and for periodic adjustment of projects and amendment of plans and programs as conditions change.

II. SUBJECT MATTER

A. All intra-regional transportation facilities and services, including *trafficways* (expressways, and arterial streets and highways), *public transit* (local, urban rapid, and suburban) and *terminals* (including parking, truck and bus terminals).

B. Plan for utilization and improvement of all highway and transit facilities, as in "A," with needed capacities and schematic layouts adequate for preliminary design and test of feasibility.

III. AREA COVERED

A. Area within cordon, for home-interview survey.

B. Area for which transportation plans are to be prepared.

C. Area of land use and population-distribution study.

IV. TECHNICAL METHODS . . . A general preliminary view:

A. Study Planning, for determination of the best methods and techniques and organization of work.

1. Study Areas, Cordons, Screen Lines
2. Methodological studies
3. Work program preparation and detailing
4. Man-hour and dollar costs budgets
5. Organization, personnel and consultants

B. Data Gathering, including assembly of results of previous studies and inventory of present conditions and past trends. The major work will consist of new home and roadside interview surveys for determination of movement patterns.

1. Population, jobs, economy
2. Land use and topography
3. Trafficways and their use
4. Transit and transit use
5. Parking and terminals
6. Movement of persons and vehicles
7. Movement of goods and vehicles
8. Transportation costs and finance
9. Transportation powers and responsibilities

C. Data Translation and Preparation for Analysis:

1. Coding, key punching and tape recording
2. Preparation of summaries
3. Mapping and charting

D. Analysis and Projections: to summarize data, to investigate relationships such as those between land-use development and patterns of travel by auto and transit, to project increase and distribution of population and employment or daily travel patterns. It is impossible sharply to separate analysis and planning ("E") since improvements to transportation systems will affect future distribution and density of population. Similarly, desired patterns of future development will affect needed transportation capacities. Items are as listed in ("B") above.

E. Planning. The transportation system will be a major determinant of the future form and density of the region's development, and must be based therefore on explicit objectives for regional growth and form as well as on objectives for quality and quantity of transportation services and facilities. Alternative assignments of future travel will be made to a range of possible plans of facilities.

F. Preparation of Technical and Popular Reports. Reporting to the public as well as to the policy and technical committees must be a regular part of the study.

G. Establishment of Continuing Study and Planning Process for renewal of data on a small sample basis. The network analysis on high-

speed computers can be varied to take account of new information on which to test the effect of some new plan or proposal.

V. GENERAL ORGANIZATION AND PROCEDURE. . . should be left flexible until technical methods and form of organization are agreed on. These requirements should be met:

A. All sponsoring agencies shall be represented on committee or committees which will determine organizational and operational policies.

B. A central staff should perform all large-scale and mechanical operations and be responsible for overall administration, co-ordination and policy recommendation. There should be a director in charge who is responsible to the policy group ("A").

C. Quality control, analysis, projection, assignment and planning should be performed centrally in a unified operation for the entire two-state area.

D. Responsible planning officials from the sponsoring agencies should participate in determination of planning and policy recommendations through membership on appropriate committees.

It is expected that this study will be thoroughly plan-oriented and will take full advantage of knowledge developed by concurrent major studies in Chicago, Washington, and elsewhere.

Despite outmoded facilities and a somewhat apathetic citizenry, a dynamic concern about the broad transportation problem and its major components has been raised in the leadership of the city, both political and civic. Most of the key people know that something must be done. Many of them have been active in the original board or have been strongly effective through their civic agency contacts in supporting the city's efforts both in Harrisburg and Washington where many of our transportation problems will be resolved.

The city's own industrial development agency and the Chamber of Commerce are convinced that Philadelphia must preserve its commercial and industrial values, and that proper development of the transportation system will help to do so by providing more effective movement of goods and employees to and from their plants. Both of the organizations believe that we can find proper locations for the needed expressways and that – even if we take some of our industrial base – we can develop other sites in larger acreage more suitable to the modern plants that should replace the ones taken.

As an old city, Philadelphia is suffering strains of many outmoded loft buildings without large blocks of undeveloped industrial land close to the city center. Therefore, it will be more difficult here than in many other cities to provide adequate industrial space. We trust that we can build circumferential routes as rapidly as the radial routes so we can facilitate travel within the city and among outlying centers at the same time we provide freer access between the center and the suburbs.

Conflicting Interests Collaborate

Our civic agencies are concerned with preserving the amenities of life in the region; they want the new expressways to be designed so as to differentiate between type of land use, to remove through-traffic from residential streets and to enhance the areas they traverse. We believe these things can be done. In locating freeways, we also have to maintain our precious historical buildings such as Elfreth's Alley, one of the oldest continuously lived-upon streets in the country, or "Old Swedes," one of the earliest and finest church buildings.

We find a willingness of conflicting interests to collaborate on plans for the long-range good. The railroads have been working with the city to find methods of strengthening their commuter operations; the state highway department is beginning to recognize that the city has a legitimate voice in all its major plans and should receive a substantial share of motor license funds. Therefore, we believe the prospects for a system of improved highways are greater today than they have ever been.

Based on work presently being done in the staffs of the City Planning Commission, the Traffic Engineering Bureau of the Department of Streets, and the Urban Traffic and Transportation Board, we are going to find agreement on the most important arterial highways needed to make the basic expressway system function properly, and agreement on a logical plan to follow in improving the capacity of these arterials.

We are convinced that the effectiveness of both the arterials and the expressway system can be enhanced and the cost kept within reasonable bounds by co-ordinated improvements in transit com-

muter lines. In our opinion, putting entire reliance on rubber-tired vehicles for peak-hour movement to the business district would change the city so radically that the city policy must continue to call for development of a balanced rail and highway system. It is believed that this balanced system can be achieved at a total public cost several hundred million dollars less than an all-rubber system.

It will be most difficult to raise capital financing for transit improvements to carry out this part of the plan, but we are working – not only within our own region but nation-wide with other cities plagued by the same problems – to achieve some understanding and to help develop some method of financing, perhaps through federal action. For example, the American Municipal Association proposes a FNMA-type financing agency to provide fixed capital on lease basis to transit companies; and, because of its total reduction in cost, has sought the approval of the federal Bureau of Public Roads to the joining of transit and expressway facilities in one right-of-way, where this is feasible, as was done in Chicago in the Congress Expressway. We also believe that grants to municipal bodies out of the taxes levied on the transit industry should be used for capital improvements.

Long-range planning is now accepted in the state highway department, and we believe that, henceforth, the department will be measuring the demands of its various systems and setting rational policies based in part on need rather than on political pressures alone. And, finally, we believe that the forthcoming metropolitan area transportation study will produce the facts needed for planning this transportation system, collating its many components into a logical operation, and developing regional agreement on the final plan.

Although the original Urban Traffic and Transportation Board believed a broadly based authority (or regional transportation organization) would be necessary, it could begin as an organization concerned with all forms of transportation but operating solely within the city limits of Philadelphia. This may be accomplished through ownership, operating agreements, contractual procedures or, more likely, combinations of all of them.

Parallel to the transportation study, the Ford Foundation has

granted nine hundred thousand dollars for a study of the metropolitan region, its economics, sociological and governmental functions; and the region's civic leaders have agreed to match this $900,000 with another $900,000.

Doubtless, this organizational study may come up with recommendations for governmental changes and procedures that can facilitate the achievement of the transportation plan and, since it will continue for a period several years beyond the development of the proposed transportation study, it could, and we trust will, assist the regional leadership in seeing that the transportation plan is implemented as rapidly as possible.

The Visibility of Highway Markings in the Atlantic Seaboard States

EVERETT WARNER

Mr. Warner's first official connection with visibility was his commission by the United States Shipping Board to design and supervise the painting of the S.S. Ochenfels, *Thomas A. Edison's "invisible ship." Later, Mr. Warner was chosen by the United States Navy to head its Design Section of deception camouflage during World War I. After Pearl Harbor, he was called back into Navy service to do the same work, with civilian status as Visibility Engineer. His assignments in the Navy Department have kept him in contact with research at the Massachusetts Institute of Technology, the Bureau of Yards and Docks, the Naval Research Laboratory, the British Admiralty, and the United States Bureau of Standards. Mr. Warner is a professional painter who has been since 1937 Academician of the National Academy of Design.*

WALT WHITMAN wrote in his *Song of the Open Road* that there are things that "may prove well in the lecture rooms, yet not prove at all under the spacious clouds and along the landscape and flowing currents."

Could this be true of some of our highway markings, designed for the motorist's safety or convenience? Are some practices – entirely satisfactory under laboratory conditions – actually working out as well under the more varied situations of the open highway?

For answers to these questions, a recent survey tour through twelve of the fourteen states of the Atlantic Seaboard was made to compare and evaluate the widely differing practices actually in use. This article does not pretend to give a complete picture of the areas involved; it is more in the nature of a sampling in which an intensive scrutiny of the few roads traversed may compensate for the limited scope of the survey.

Visibility is an obvious aim of our highway markings, but so much confusion exists in many minds that it may be well at the outset to define it. It is useful to take certain paints to the colorimetry section of the Bureau of Standards, to determine which ones have the greatest brightness, or their "apparent daylight

reflectance"; but this test tells nothing about their visibility when put to use on the highways.

In a strict sense, no hue or shade of paint is any more or less visible than another. Whether an object is seen well, poorly, or not at all, is often attributed to its hue, brightness, or its position in relation to the light, but these are only component factors; they do not determine visibility, which in the last analysis boils down to just one thing: *to what extent does it match, or differ from, the background against which it is seen?*

Contrast is the key to visibility, and the red sign considered so conspicuous, may scarcely be noticed against a red brick building or a bank of red clay. A black post may remain unseen against dark evergreens, and the white one – which stands out clearly against the dark foliage background – may, when protruding from a snowbank, be so nearly invisible as to prove a dangerous hazard to the motorist it was intended to protect. High brightness may be the best thing or the worst, and no conclusion is valid until it has been proved by ample visual observation.

Most persons are aware of these fundamentals in perception, but there is a tendency to accept practices that are in vogue, without subjecting them to careful examination. The real threat does not lie in methods that do not work at all, but in those that work just well enough to satisfy our indolent observation, and leave us in the firm belief that nothing better could be devised.

In the course of this survey, attention will be invited to some of these practices, and for greater convenience, the comments will be grouped under three heads: Pavement Markings, Highway Posts or Fences, and Signs and Warning Devices.

Pavement Markings

Of the twelve states traversed between New Hampshire and Key West, six use nothing but white pavement lines; five use yellow and white in combination; and one, Florida, uses nothing but yellow paint. It is difficult to see how any driver can pass and repass through these areas and not come to the conclusion that the states using only white lines have a definite edge over the others, if we limit the question strictly to visibility, and put aside for the moment

any psychological aspect. The advocates of yellow believe this compensates for that paint's materially lower reflectance of incident light.

The contention that long use has given to yellow an almost official status that insures respect, may be justified when it is employed on roadside signs that may come into conflict with commercial announcements. But there is nothing to bar the advertisers from using yellow also, and since they have not yet invaded our pavements, all markings there are certain to be accepted as official. Those states that have introduced white paint into a formerly all-yellow pavement program use white for the center line of main highways, thus giving a more positive definition to that important median line; solid or broken yellow lines on either side indicate whether passing is permissible or not.

There is plenty of precedent for using a different color to designate a different kind of information. Paris motorists find advantage in the fact that in a large open area like the Place Vendôme, the traffic lanes and parking spaces are designated by different colored paints.

From our use of two paints, it seems possible that yellow might acquire in time a special significance in the minds of motorists, but not until the practice is uniform and statewide, with all center lines white. At present the two-color scheme is confined to main highways, and nothing but yellow is used on secondary roads; yet they are the ones that most need the white center lines, because, with one exception, the states using this device are all in the South where traffic from unpaved side roads often brings enough high-colored clay onto the highway to give yellow paint serious competition.

Many of our reactions are not the result of conscious thinking, but an unconscious response to past experience. If one were driving along a broken white line, and caught sight of yellow ahead, it might give a sharper warning against passing the car in front than one would get from a glimpse of doubled white lines. It is necessary to weigh this gain from association against the probability that white paint would be discovered at a greater distance.

A continuous solid or broken center line on every road where the surface will support paint should be a major goal of highway engineering, since on foggy nights this has saved many a life by

keeping the driver on the road. Of less vital importance are the lines used to mark the extreme outer edge of the pavement, and this practice is now spreading from the superhighways to the narrower roads, where there is often greater need for it. On Route 301 in Georgia, such a line gave a better warning than a lettered sign. It was on a rather dangerous curve approaching the southern end of the Savannah River bridge; the outer edge was marked, not with a solid line, nor with the long dashes of the typical broken line, but with a white dotted line – which by its unfamiliar pattern gave a staccato warning to the driver, and guided him around to the bridge.

Paint Characteristics Compared

The proponents of yellow paint may not have given sufficient weight to one aspect of its behavior. A bright shade of pure yellow (always better than one verging on orange) will show up fairly well under headlights, either on wet or dry pavement after night has closed in. But that hour between daylight and dawn, or daylight and dusk – that half-light when you begin to wonder if there is anything the matter with your headlights, because they light up the road so poorly – is precisely the time when yellow puts on its poorest performance. On a concrete road it will almost disappear a short distance ahead of the car.

This weakness, occurring at a high accident-period of the day, involves a rather technical explanation. The human eye is so constructed that its sensitivity to the colors of the spectrum differs at varying illuminations; and although as the light fades the eye retains its capacity for perception of blue or violet, the yellows and reds lose more quickly both in brightness and in characteristic hue when seen under illuminations the physicists describe as "below the Purkinje level."

This Purkinje effect is a curious phenomenon, which can be examined with a flower garden as a laboratory. After dusk one may wonder what became of the yellow and red blossoms which were there before sunset; and if one picks what seems to be a white flower, it is an even chance that indoors it will be discovered to be a light blue or violet blossom. The Purkinje effect may not prove of major importance in peacetime; but under sudden aerial attack,

with supply trucks operating on the roads without lights, while we were getting around to applying chemically luminous markings, the yellow paint would be much less effective than white in keeping our convoys on the road.

Only one radical innovation in pavement marking came to light during the entire survey – the center line on Brickel Avenue in Miami. At first glance it was believed to be the accidental effect of a broken white line superimposed on the dark middle joint of the concrete; but further examination seemed to indicate alternating bands of black and white paint. Nothing similar was noticed on either the west or east coasts of Florida, and whatever its origin or intention, it was astonishingly effective on this very light concrete surface – so good that its introduction as a center line on such paving material merits serious consideration.

In France very little paint is used except in the larger cities, and in Paris the pedestrian crosswalks are indicated by rows of metal disks, set flush in the surface of the street. Traveling National Route 7, the main artery between Paris, Lyons and the Riviera, one will encounter few center lines. If hills and curves are marked at all it will be with those metal disks, so highly polished with traffic that at times they will catch a sharp glint of sunshine, and at other times appear so dark as to be scarcely noticeable.

Their visibility at night is equally dubious, because, though their mirror-like surfaces are brilliant in the light of an approaching car, your own headlights fail to reveal them at all, and they will not inform you of a curve ahead when you are alone on the road. These metal disks are not judged to be remotely the equal of painted lines. If pavement insets are favored, better ones are provided by what in the British West Indies are called "cat's eyes." Although these make a small bump in the paving surface, they reflect to the driver a distinctly visible flash.

The overall picture of pavement marking in the Eastern Seaboard states is excellent, and its progress has kept pace with growing traffic problems. Comments offered here should be regarded as comparisons between what is good with what is judged to be a shade better. It is not difficult to find paints that will give suitable contrast when applied to surfaces that vary no more widely than the paving materials in general use. But when we leave the pave-

ment for the side of the road the question becomes more complex, and it has not always been solved in as satisfactory a manner.

Highway Posts and Fences

The cardinal necessity of providing contrast with the background remains unchanged as the main objective; but it is now a background of infinite variety – not always even a solid palpable substance – for the highway post may be seen against fog, snow, sky and water. Its visibility has to be assured against climatic and weather changes, the foliage variations of the four seasons, and the radical changes in lighting as the sun wheels through its daily course.

How could any one single shade of paint be capable always of performing that service? It is obviously impossible; and in this regard the European practice of using two colors of paint, to provide dual visibility, is carried out effectively. In France, white posts are used, to which a red cap, or band, has been added at the top; Lombardy uses the Italian device of putting a black band around the middle of the white post.

Only one of all the states included in this survey – Virginia – has provided this maximum possible year-round visibility, painting the caps of white posts black; probably better than the French red paint for this particular terrain, because Virginia is one of the states in the red clay area. Since black and white lie at opposite ends of the brightness scale, they make a good team, with one or the other showing up against almost any background. It is strange that we have neglected this simple formula for visibility insurance; it is far from new, and was used on railway crossing gates when many of our highways were nothing but dirt roads.

Occasional experiments with the dual visibility idea are found here and there; for instance, posts striped in barber pole patterns. These are not successful, because the stripes were too numerous and too narrow. Outside of the Old Dominion, the only program worthy of mention is that stretch of black-topped white posts on Florida's Route 1, where it runs for many miles along the Indian River, and dual visibility might be useful to maintain contrast against sky and river. Visibility of the yellow posts on Route 301

in South Carolina could be enhanced with a wide band of white around the middle; but even there, the basic yellow is a poor choice for this particular state, because it offers too little contrast with the prevailing color of the roadside earth.

Connecticut posts are a sort of mousy brown, similar to the color of some tree trunks. This is not to be criticized on the Merritt Parkway, because the posts are not close to the pavement, but form a harmonious element in the landscape. However, on Routes 5 and 5A where posts are closer to the highway, a fair objection can be made that the mousy brown is not sufficiently visible in summer, especially at night; though it must be conceded that this coloration policy will give better mid-winter results than the methods adopted by the two states just to the north, where there is heavier snow.

Both Massachusetts and New Hampshire have adopted partial dual visibility systems, the standard post being white with a black base, and a material advantage is gained through perhaps eight months of the year. But after snow falls, and the plough turns a big bank of it over the black paint, the white tops have so little visibility against the snow that for the remainder of the winter the posts would be better turned upside down.

In Connecticut it would be necessary to put a wide band of white around the middle of all the posts, and in the two states using two kinds of paint already, a complete dual visibility could be achieved by transferring a part of the black paint to the tops of the posts. At least half of the post should always be white, because nothing has a wider range of utility by day, and under the perpendicular rays of headlights it is outstanding at night – greatly superior to those little dark stakes carrying a tiny reflector, that are now being used on so many superhighways.

The dark cap appears so logical a step for all northern areas that its eventual adoption seems certain. But the black base is important too, even though it may be concealed by grass or weeds, because at other times a white base might be too close a match for roadside sand or gravel and it is the base of the post which best indicates its distance from the driver.

We read frequently of cars piling up against telephone poles, and during this survey a surprising number of poles were noted – some almost on the edge of the pavement – all relying on a typical

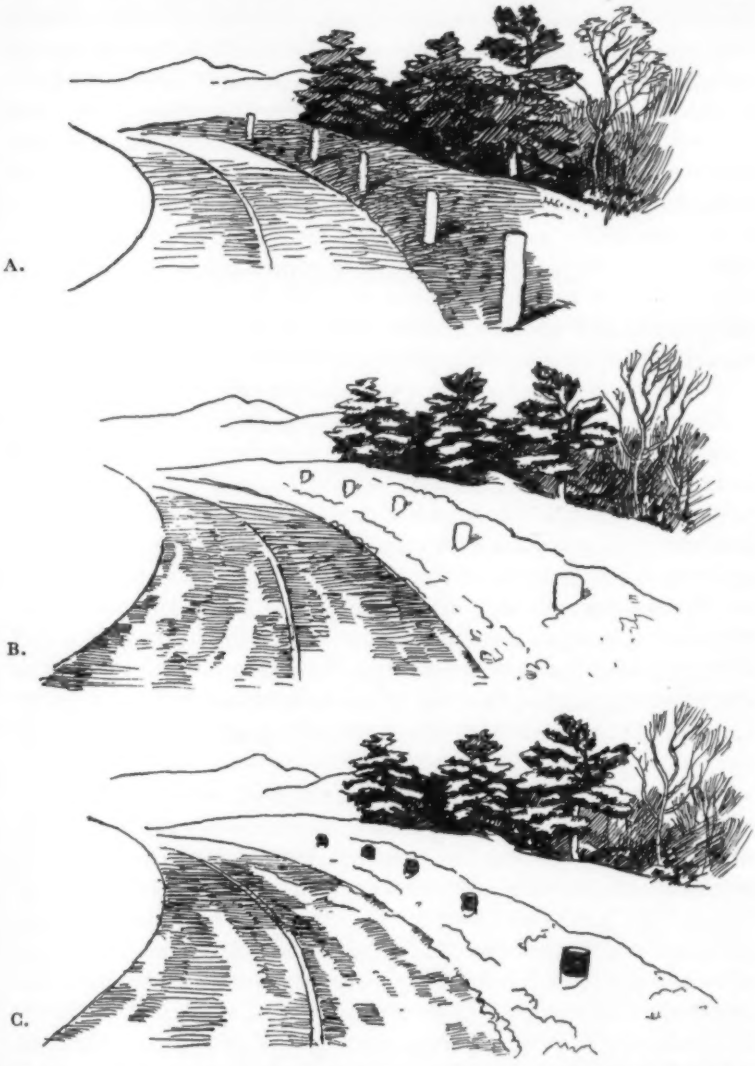


Figure 1. (A) Against normal roadside backgrounds, the all-white post has excellent day and night visibility during part of the year. (B) Even with a dark base, white is still unsuited to northern winter use. (C) White, with a dark base and a dark cap, has superior, all-purpose utility.

gray or brown to give them sufficient visibility. This is far from adequate, even before dark; and since the utility companies do not enjoy having their poles knocked down and service interrupted, they might be induced to see that they could save money by painting one or more bands of white around the poles. And no official regulation would be needed to remedy these very genuine hazards on our secondary roads.

Breaking Down the Visibility Myth

No matter how much scientific study and research go into the formulation of our marking program, the final test of its merit rests with the average motorist, whose habits of observation are casual indeed. His eyes may take in everything, but the visual images might be compared to exposed but undeveloped film – it's there but not exactly available. He can call upon enough for recognition purposes. If he has a favorite gasoline, he can single out its typical emblem a long distance ahead on the highway, but if asked to describe this sign, he would be completely at a loss.

His reactions to highway warning devices are instinctive and therefore a normal response to the actual situation, but a poll among motorists would be without value; we can not depend upon the driver for advice, because when he becomes articulate he remembers little of what he saw, and his report on it is a curious mixture of observation and pure folklore.

The extent to which the folklore of visibility is gospel to millions of otherwise well-informed persons can be hardly overestimated, and when it penetrates the realm of high authority, it has far-reaching consequences. Documents, captured after the close of World War II, revealed that those to whom the painting of Japanese naval vessels was entrusted, found it impossible to convince the navy officials that black was not the best paint to diminish the visibility of large capital ships operating under cover of darkness. No shade of paint would be always helpful, but white would have proved less visible more often.

The flight officer of our own "Baby Flat Top," which scored the greatest number of submarine sinkings, reported that their success was due to their having painted all their planes white, thus

enabling them to sneak up closer before being detected by enemy submarines which had surfaced at night to charge their batteries.

The belief that black, being the color of darkness, is necessarily invisible at night under all situations, is one of the most widely held of the myths of visibility; but its corollary – the assumption that white, having the highest brightness, is therefore an essentially noticeable paint – runs it a close second. It has been suggested that these convictions resist the influence of adult observation and experience because they are conditioned reflexes, stemming from indelible impressions of childhood. It is not a matter of eyesight, just a curtain drawn over the mind, and the fact that the opinion is rooted in a true, but too-limited observation gives it an even more tenacious hold.

On a rainy or heavily overcast day is the neighboring white house darker or lighter than the gray sky? Some will assert promptly that the house is lighter, and then go outside to have this opinion confirmed. Perhaps deceived by a dark mass of trees behind the house, they may maintain that they were right. If you cut two holes in a piece of cardboard, and hold it so that you can isolate portions of house and sky, you will notice that the so-called gray sky is very much lighter.

Relative appearance is the basis of the science of highway visibility. If you continue your observation of the house next door, you will discover that it is consistently darker than the sky in rainy weather; yet in a few minutes the clouds may thin sufficiently to allow a weak light from the sun to turn the walls into an almost perfect match to the sky. As the clouds break away entirely, the house may become a brilliant blazing spot against an infinitely darker sky, giving you an insight into the variable appearance of white paint.

The amazing vitality and durability of the myths of visibility folklore are well exemplified by the Geneva Convention. As far back as 1868 a group of eminent persons gathered for their second conference in Switzerland, and, deciding that the protection of hospital ships demanded maximum visibility, decreed that they should be painted "white with a green strake." With the addition of red crosses for further identification, this remained the unchallenged international practice for more than seventy-five years.

Probably there were no previous experiments or observations – so sure were the delegates that white was always the most visible pigment.

Ibsen said it is "easier to overthrow a dynasty than a firmly established belief," and this one resisted investigation until 1944 when our Navy became disturbed over reports that attacks on hospital ships may have been made by our own or Allied planes. The Bureau of Ships sent a team down to Hampton Roads to study the appearance of the USS *Consolation*. On gray, overcast days she was easily the least visible vessel of the fleet when viewed from surface craft, and at night our observation plane had difficulty in locating and identifying her. White paint, which has such a splendid record for day or night visibility on our highways, has on the sea lanes a radically different pattern of performance.

The painting of this vessel was a grave *tactical* mistake, because, though she was quite conspicuous when seen down-sun on a bright day, there was small likelihood of errors in identification in such weather. Her white paint was wrong for night and other periods of reduced visibility when she was most in need of protection against mistaken attack. The tactical approach has some importance in highway painting also, since we may have to decide which compromises are wise, particularly in the treatment of signs.

Signs and Warning Devices

Some signs convey their message through semi-pictorial symbols or by patterns, which through long association have a connotation of danger in the driver's mind. Of this type, the design of alternating diagonal stripes – sometimes called herringbone but familiarly known as the zebra – is the most commonly employed to indicate dead-end streets, dangerous curves, or bridge abutments. Much used for confusion camouflage during both World Wars, it was the subject of close study and observation by both the British Admiralty and the U.S. Navy, and its application to our highways often is not consistent with the principles established by this wide war-time experience.

For example, all over this country are any number of small concrete bridges, with low parapets, terminating at the ends in flat

vertical surfaces about a foot wide and perhaps three feet high. In New England we are in the habit of leaving them just as they are, and finding them reasonably visible against the normal background situation. Farther south an increasing tendency is to decorate these concrete faces with narrow diagonal stripes of black, alternating with white or yellow, and the bridge-ends are nowhere near as visible as if they had been left alone. The error is one of scale. The stripes are too numerous and too narrow, and at current speeds the danger signal is not seen at sufficient distance.

All patterns, relying either on brightness or color, have an optical resolving point, dependent on distance and the size of the elements; beyond the distance at which this becomes operative, the whole pattern merges into a composite shade, usually much less conspicuous than any of the paints used alone. Toss your newspaper on the floor and you will notice that the fine print has reached its resolving point and appears as a pale gray area, attracting less attention than the open patches of white paper or the dark illustrations. If one of these bridge abutments were painted white, or restored to its natural concrete color, it would be more visible than this particular zebra.

As applied, such small zebras are weak devices, and an unforeseen handicap developed to support the contention that the final test is under the open sky. The bridges in this case are narrow ones, just wide enough for two traffic lanes, and the car wheels run so close to the abutments as to splash them unmercifully, leaving only the upper portion visible. In those southern states where yellow is favored for the zebra diagonals, the clay splash reduces their value to zero. There is a solution to this problem, and Virginia has found it: on the Blue Star Highway, bridge abutments have been left alone, and close beside them are zebra squares, elevated on posts to a height well above the splash level.

The masonry of highway underpasses offers a larger space for zebra application, and the stripes are usually wider, and therefore well adapted to signal a warning at the proper distance. But in some instances an otherwise satisfactory job is marred by a failure to understand the special optical character of this pattern. If the painter starts the diagonal bands on the outer face of the masonry, and carries them over the corner to the inside wall of the underpass

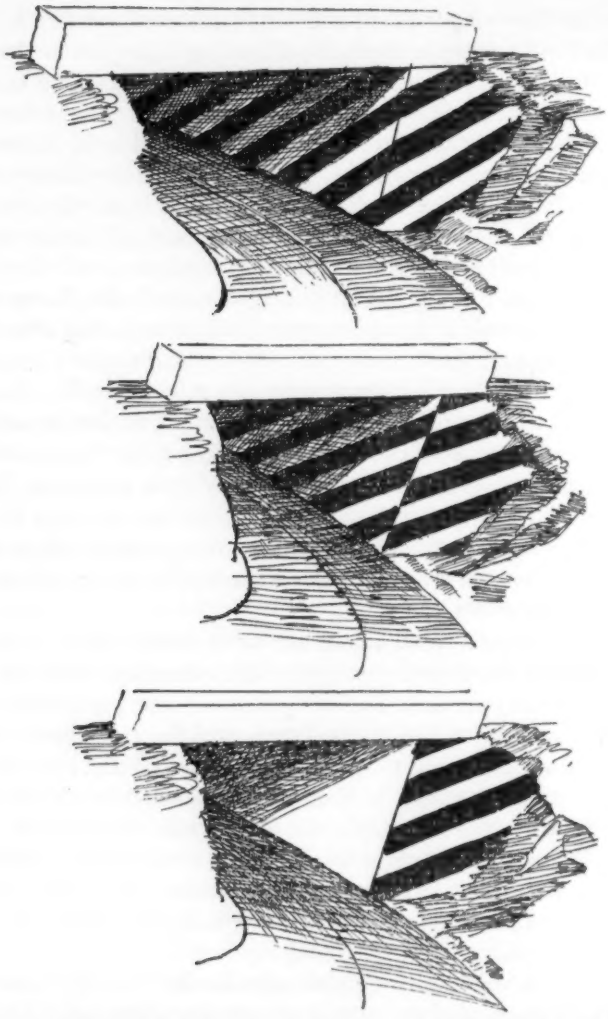


Figure 2. (A) Carrying the diagonal bars in continuous lines over the corner which divides the two walls tends to conceal that corner. (B) The pattern should emphasize the exact location of the corner of the masonry by staggering the bars at the corner. (C) The best solution is to apply the zebra pattern to only one wall of the masonry, generally the outer face, but depending on the approach.

Figure 3. Just below the vessel's foremast is an apparently jutting corner, which is pure zebra illusion, the hull of the ship being flat at that point. Not only does the zebra tend to obliterate real corners; it is capable of creating entirely imaginary ones.

without any break, he is signaling danger; but at the same time he is *concealing something that is important for the driver to know* – the precise location of the corner of the abutment.

The effectiveness of a zebra in concealing a corner made it useful as a wartime defensive measure in painting ships. Since the true location of the structural corners of a vessel aids the enemy in determining the target angle, we made a practice of wrapping zebra patterns around real corners, and bringing them to a sharp break at other points where no corners existed. Obviously a contrary practice should govern application on highway installations, and the pattern should get a sharp break right at the actual corner, by staggering the ends of the white bands against the ends of the dark ones. In my opinion as good or perhaps better results can be obtained by applying pattern to only one wall, stopping it sharply at the corner, and leaving the other wall in natural cement, or painting it white.

Between these geometric patterns and the lettered signs, is a large group of semi-pictorial devices. The most widely used is the square yellow signboard, balanced on one corner and bearing a symbol which represents an approaching curve or a crossroad. These gain in value because of a general uniformity of their use throughout the states. While only a few of these partially pictorial signs are seen in this country, several dozen are in common international use in Europe; and one can drive hundreds of kilometers without encountering a fully lettered sign except the names of the towns. Instead of the word SCHOOL or CHILDREN, will be seen a triangular plaque, on which is pictured a pair of children hand in hand. The silhouette of a man with an upraised pick warns you to expect MEN AT WORK.

Railway grade crossings are marked either with a quaint picture of a foreign locomotive, or with a gate – different signs to tell whether the crossing is guarded or not. Permitted parking will be indicated by a white letter P on a square blue ground; if on the other hand, a red ring encircles a black P, which has been crossed off with a red diagonal bar, it means that parking is forbidden.

With an open mind about the desirability of adopting some of these symbols, my view of the moment is that the Continental custom is best for them because of the many languages spoken, but for us nothing has quite the impact of words.

European practice makes a wide use of color, and we might wisely extend our program by assigning special hues to identify the continuity of certain highways. In Florida, a white figure one on a small red shield keeps motorists from straying off on Route 1A, but outside that state this identifying color is lost. Although it would be helpful if it could be retained northward through all the states, the need for individual marking is not as great on main arteries as it is on the more confusing roads that cross them.

For example, New York State's Route 67 bypasses the traffic of many fair-sized cities. It follows a tortuous course, crossing three of the state's main arteries, turning left, sometimes right, but in every case traveling briefly along these main highways before resuming its westerly way. What a boon it would be if the Route 67 marker had adjacent to it, not necessarily an integral part of it, a special eye-catching color on a plaque of individual shape also – a triangle, circle or square. The monogram of the New Jersey Turnpike Authority is of tremendous help in leading motorists from the west end of the Washington Bridge to the toll road entrance. Regardless of whether many bother to decipher the initials, they follow that characteristic spot of color.

Reflectorized Signs; Day and Night Use

In examining signs bearing words and numbers, it is well to remember that those reflectorized for best results after dark may not prove the most readable in daylight, and vice versa. It will simplify the discussion to deal first with effectiveness during daylight hours, quite apart from the appearance at night.

As to the choice between dark lettering on a light signboard and light letters applied to a dark background, the latter method has been endorsed by a body of eminent opinion. Even though the accepted belief can be demonstrated through static experiment, it is questionable whether it is applicable in highway use, where time, speed, and perhaps even vibration are factors in vision. Observation of the states included in this survey leads to the opinion that a white signboard is the most effective, and more readable against a strong light. Seen from driver's eye level, the average backgrounds are dark – at least dark enough to give strong contrast to the white

board more often than any other, and therefore it will arrest attention sooner. Even if discovery is only a fraction of a second earlier, it might at high speeds make the difference between reading the message and missing it altogether.

Most of our superhighways are being equipped with dark signboards because it is more practical to apply reflectors to white letters. If some measure of daylight performance is sacrificed, one may well ask if maximum efficiency is necessary or even desirable as long as information and warning are adequate at a lower level. With reference again to the Merritt Parkway, its white-lettered, green signboards are large enough to compensate for any handicap in readability, and harmonize with a planned pattern of landscaping. White signboards of equal size would have vastly more impact, but they would jump into view like billboards of a real estate development.

This assumption about the appearance of a large white sign is not entirely guess work; one can examine plenty of small light-colored ones, and draw deductions from the extremely high readability of their warning against discarding trash. Signs of similar size, seen close together, but differing through a reversal of the background and lettering, can be found on that part of Massachusetts' Route 2, "The Honorable George W. Stanton Highway." One sign reads, NASHOBA CREEK, in light letters on a dull red background; the other, ENTERING ACTON, in black letters on a cream signboard. Viewing such a controlled comparison, the author believes there would be agreement on the marked superiority of the light signboard.

These are the smaller, less important announcements of this highway. The large signs that indicate exits and intersecting roads are on dark maroon boards, in well-formed, readable, reflectorized white letters and figures – distinguished in style. The careful spacing of words and letters – neither too close together nor too far apart – should not lightly be dismissed as an attribute of art: it is functional in readability.

A research group came out recently with a report declaring that lower-case lettering was more readable than capitals, but there is no wide acceptance of this dictum, and some of the newest and best installations employ nothing but capitals. The New Jersey Turn-

pike has placed the emphasis where it belongs, by assigning all capitals for use at interchanges, and employing partly lower case for somewhat less vital information relating to restaurants and services.

Not many years ago, after making a choice of routes at an intersection and driving a few hundred yards, the motorist would be assailed by doubts, positive the arrow had pointed in the opposite direction. Roads seldom had a confirming sign or route number, so the motorist turned around, drove back to the intersection, and found that he was right – or was he?

Today, there is nothing more radically improved than the arrow. Gone are the slender shaft and feathered butt, so easily mistaken for the directing blade. Those that still retain a vestige of the conventional arrow are good, and wherever a turn is involved, a bend in the shaft is more convincing than a straight horizontal arrow. Well-designed arrows should always accompany directional text, because a great many motorists make a correct turn on an arrow, but can not be relied upon to do so on a worded sign.

Colors that Reflectorize

Despite the efficiency of the white signboard, the vogue for reflectorization will probably restrict its future use to the small sizes where the dark board shows its greatest weakness. Massachusetts has installed on the freeway between Boston and Fall River, large cream-colored signboards with reflectorized black lettering, but their daylight effectiveness is disappointing – inferior to that of the very fine dark signboards with white lettering on the Stanton Highway. The trouble is that the white reflectors cover so much of the dark lettering that it is reduced to gray at a distance, and the impact of a real black and white sign is missing. The application of reflectors to dark lettering becomes progressively less effective for daylight use as the signs decrease in size; on some small shields, route numbers have been almost obliterated by the reflectors.

New Hampshire uses a minimum of reflectors; the more usual practice is to execute the text in ordinary dark paint on a background of glass-beaded paint which reflects the headlights. This method is judged to produce a better round-the-clock performance, but only if there is a proper balance between visibility and readability, as there is on the yellow squares bearing symbols to indicate

curves or crossroads. These have the right amount of added reflectance to make them excellent at night, but many of the white signboards are too bright; though they may jump into view a half mile away, they remain a blinding blank rectangle until the driver is almost abreast of them. Only after the headlights have passed off them, leaving them in the penumbra of diffused light around the car, do they glow and give their belated message. One would not expect to read a text on the lenses of headlights; why expect to read a sign while it is throwing back in one's face such a large percentage of that light? Through an optical effect known as halation, a strong glare overruns and destroys such small images as those of lettering.

Glass-beaded paint has broadened the field for the effective use of color, but it should be remembered that the enhancement operates only after dark; during the daylight hours these highly colored signboards will have the limitations imposed by their low brightness. When at their full intensity of hue, most colors are fairly low in the brightness scale. What we call a bright red has a reflectance rarely in excess of twenty-five percent, and a signboard of such paint will have so nearly the same brightness range as the normal roadside background that it must depend almost wholly on difference in hue for its effectiveness.

The contrast produced by light and dark has been found to be more reliable. Ordinary white paint, with a natural reflectance of approximately seventy-five percent, has not only a high visibility potential in its own right, but it has also the capacity for intensifying the appearance of any hue placed upon it, or adjacent to it. The French tricolor and our American flag owe as much of their colorful appeal to the white as to the colors that get all the credit.

Red and blue, adjacent to each other, establish a dual visibility of sorts, but it is a very weak, ineffective type, typified by our patriotic letter boxes with no white on them except some inconspicuous lettering, and the small panel giving the collection hours. They are only slightly easier to locate than the former green ones, and need a broad band of white paint around the middle of the box. On the other hand, mail trucks with a large area of white paint between the red and the blue, are quite conspicuous; not long ago a Boston paper reported that lower costs for collision repairs were attributed to this method of painting.

A generous amount of white, used in combination with color,

is of great value. For this reason, the octagonal red signboards – which in many places are supplanting earlier installations and which have no white beyond that in the four letters of the word STOP – are less effective. Those executed in glass-beaded paint glow under headlights, but is this the time maximum performance is needed from a sign with this particular function? In my opinion, daylight effectiveness is the more important, and to accomplish that purpose best a white signboard with big red letters and a broad outer border of the same color should be used.

If executed in beaded paint, such a sign would have excellent appearance after dark, and have a better daylight average than the solid red signboard. Stressing the importance of daylight efficiency is based on the fact that stop signs will be found in greatest numbers in urban and suburban areas, on both sides of many thruways, and often the crossings will be completely blind. At night the driver will become aware of cars approaching on a thruway from their headlights streaming along the pavement, but by day he has no such warning, and it is imperative that the stop sign be commanding enough to bring him to a halt. These new red signboards seem to be something less than a possible best, although superior to some others that fail completely to give adequate daylight warning. One is a yellow signboard, with STOP in red letters, studded with reflectors large enough almost to obliterate the word. After the sign becomes somewhat weathered, it is reduced to a meaningless spot.

Yellow is a notably poor background for red letters. These rectangular yellow signboards bear on the upper half the word CAUTION, painted in red in the mistaken belief that it gives emphasis, and on the lower half in black letters, a variety of words of which CHILDREN is possibly the most common. These signs have no added reflectivity and, standing slightly removed from traffic lanes, do not amount to much at night; but by day the black-lettered word can be read easily, yet at the same distance the cautionary word is still a red jumble.

To know in advance that yellow will not produce proper contrast for scarlet lettering may have required some knowledge of the spectral distribution of yellow paint; but to know afterward that it did not work, requires no expert vision – and the unquestioning acceptance of these signs is cause for concern.

This uncritical attitude leads to routine practice: if a yellow sign, standing six feet above ground-level appears to work well, it is assumed that the same hue will be appropriate for a low-placed MEN AT WORK sign – which may remain little noticed against freshly turned yellow earth. The yellow paint pot is regarded as eminently safe for all occasions and is used without discretion – even on hydrant caps on Cape Cod where it would be hard to find a more unsuitable paint.

Hydrants deserve more attention than they have received, because in smaller cities they stand at the sidewalk curb and in more rural communities often at the border of the highway pavement. They are painted in great variety – yellow, red, black, dark green, aluminum, and in combinations of these colors. This wide variation in color would be excellent if it represented an adjustment to fit special situations. Some are better than others, but all of them would be improved by a band of white paint around the middle of the hydrant. No object standing immediately at the edge of traffic should be dismissed as unimportant, meriting no more than routine treatment, when more alert practices could increase visibility and promote highway safety.

America's Vigorous Postwar Enterprises: The Roadside Motels

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ONE of America's newest business enterprises developed with the automobile and the modern highway system. Within the industry a host of designations have appeared – tourist court, motor court, motor inn, motel, autel, motor hotel, and highway hotel. Regardless of variation in name, if they are near the side of the road, of one- or two-story construction, and offer parking convenient to the room, they are all motels to the traveling public.

A motel is also defined as operating on a self-service basis, without bellmen, and offering only limited guest services. The highway hotel combines the physical characteristics of a motel with the complete line of guest services expected of a downtown hotel. While it represents a union of the more desirable features of both a motel and a hotel, it is usually regarded as another motel by the public.

Rather crude "tourist cabins" began to appear along the roadsides in the early 1920's. Since that day, the motel industry's development has paralleled the development of the automobile. Although there are no exact statistics, reliable estimates place the present number of motels at approximately 56,000 establishments, composed of about 1,150,000 rooms, with a total investment of approximately $6 billion. The annual gross revenue of nearly $1.5 billion provides a livelihood for more than a quarter of a million people.

The growth of the industry received its earliest, and possibly greatest, stimulus from the depression of the 1930's. "Tourist courts" of that day usually offered accommodations – such as they were – at a slightly lower rate than hotels charged. Furthermore, motels were operated on a self-service basis, eliminating the need for tipping.

Industrial expansion during the war produced a mobility in the population never before equaled. Many persons who had never traveled before sought motel accommodations because of their informality. Others, accustomed to frequenting hotels, became acquainted with motels because of the scarcity of hotel rooms. The majority of both groups remained motel patrons – while enroute to their destination, at least.

The motel industry has really come into its own estate since World War II. Its expansion in the post-war years increased the number of individual establishments by an estimated 150 percent. The number of units, or rooms, of the average motel almost doubled in this period. Attractiveness of architectural design and the extent of guest facilities have also increased proportionally.

Some years ago, a United States government publication advised the prospective investor that a good motel could be obtained for $1,750 per unit. In 1950, a well-known authority on the hospitality industry wrote that a good motel could be built for approximately $5,000 per room and could be furnished for about $700 per room. Today, most motel construction costs from $8,000 to $10,000 per room; and some investments, especially the more luxurious highway hotels which run the gamut of guest services, cost up to $12,000, and more, per room. For these reasons, many writers classify the motel as a post-war industry.

Motel Convenience and Accessibility

From the early days of automobile travel, it was obvious that hotels inadequately met the needs of motoring travelers. After World War II, the nation's income began its climb, and with it came increased leisure, paid vacations, and automobile ownership. Today approximately eighty percent of all travel in the United States is by automobile. A preponderance of these travelers prefer motel accommodations.

When questioned regarding the reasons for their preference, motorists most frequently answered, convenience and accessibility by car. Motels are usually on main highways at the outskirts of cities and towns, away from congested downtown areas. Since the traveler may park at his door, he does not need to unload all of his luggage. This factor especially appeals to family groups, who com-

prise the bulk of the patronage. They usually carry a large amount of luggage and some forgotten item can easily and quickly be retrieved from the car. Departure the next morning is speedier because of time saved by not having to re-load the car.

The very newness of this type of lodging establishment presents a strong appeal to the traveling public. Most of the hotels were built during the 1920's. The depression forced many of them into bankruptcy, and the majority of those remaining barely survived – expending nothing in modernization and a minimum in upkeep. Consequently, the new motels which sprang up after the war to meet the need for more rooms were more modern and up-to-date. They also, more frequently than hotels, were planned and furnished to meet the growing trend of family group travel. The comparative modernness and attractiveness of motels over hotels has held a decisive appeal to travelers.

The early moteliers were adventurous investors who saw a need for a new type of accommodation and attempted to supply it. Because they filled the need, they prospered.

During the 1930's, the industry attracted many middle-aged, or older, men with small capital and a desire to invest in something that would supplement their retirement income. Some of these acquired good locations with little or no competition and did well. Some entered the business just before the wartime shortage of accommodations and managed to survive. Others, lured by the myth of great and easy returns, failed. They learned that it is *not* a business that produces fantastic profits from small investments and little effort.

Larger Investment Needed Today

Essentially a small business, most motels are owner-operated. Many do not have any employees. However, with the number of rooms per establishment steadily increasing, together with demands by patrons for more facilities and guest services, the need for professional management has developed and increasing amounts of corporate capital have been required. Motel chains have appeared and several hotel chains have invested in roadside properties.

Prior to World War II, the average motel consisted of eight to

twelve units with a value from $15,000 to $30,000. Today the average motel has about twenty units and costs about $150,000 to build. Most of the new courts consist of twenty-five to forty units. Quite a few exceed one hundred units and represent an investment in excess of one million dollars.

However, the size of newer motels and the investment they represent do not preclude the successful entrance of a small investor at this date. It remains preponderantly a sole-proprietorship industry, and will continue to reward the small businessman for some time to come.

But the potential investor should approach the field warily. A long-held consensus is that the motel industry proffers phenomenal financial rewards to investors. This is not true. Analysis of the records of some highly successful operations reveal that they yield a fair return on the investment plus just compensation for the time and efforts of the operator – and little or nothing more. A large percentage of motels pay their owner-operators rather poorly for their time and labor after a fair return on the capital investment has been deducted from the net profits.

Strategic Location Essential

Probably no other industry is so dependent upon a strategic location. The choice of one side of town over the other can mean the difference between success and failure. Indeed, the choice of the proper side of the road can spell the difference between a successful operation and a miserable existence.

The author has asked numerous operators how they choose a good site for a motel. Some of the less successful operators admitted their uncertainty. The more successful operators, almost to the man, gave one answer. Whether he was an operator whose experience was limited to one establishment purchased as a "going concern," or a developer of motel properties for resale, the respondent usually stated that "a person just has to have a feel for the business to recognize a good location."

In the eyes of a potential investor, this statement might lend a certain mystic value to locating a successful motel. However, intuition and impulse, even in the most gifted, are poor substitutes

for careful investigation, analysis, and planning in a highly competitive industry.

Numerous factors affect the desirability of a particular site. It is certain that those who are able to choose desirable motel sites, evaluate the particular site in the light of these factors, although they may not do so consciously. The location that possesses all desirable elements is rare indeed, but effects of, and compensations for, each factor should be considered.

The first factor most people want to know in choosing a location is the average daily volume of traffic. Since this is a roadside industry and dependent upon motor traffic, the traffic volume is important. But it is only the beginning figure and requires careful analysis.

If the volume is very low, the number of potential guests will be low. If the traffic flow is very heavy, many otherwise potential guests will bypass the location because of the difficulty of leaving and re-entering the stream of traffic. Extremely heavy traffic should be looked upon as a warning of the possibility of re-routing, establishment of controlled access, or otherwise diverting the potential patron from the driveway of the motel, rather than as a guarantee of success.

Whether the greater number of travelers are entering or leaving the area must be ascertained. The direction of traffic will determine which side of town is most desirable. Although some surveys have shown that the greater number of travelers indicated that they prefer to drive through a town and stop on the side of departure, analysis of their performance shows that they actually stop on the side of entrance. This deviation is probably because only a very small percentage of motorists makes advance reservations for accommodations. They simply drive until they reach the town they had chosen for the day's destination and seek lodging at the first appealing motel that appears to have a vacancy.

The direction of traffic flow also determines the side of the road for the establishment. Motorists are very hesitant about crossing oncoming traffic to get to a motel. They will drive on until they become fairly certain that there are no satisfactory accommodations on the right-hand side of the road before crossing to the left. They are just as reluctant to turn back to a place that they have passed.

Traffic flow maps are prepared by the states' road departments and many of them separate the gross traffic figure into truck traffic, local traffic, and through-traffic. The through-traffic figure is the one of interest for motel investment, because the truck traffic and the traffic from the local and adjoining counties cannot be valued as potential guests.

O-D Studies Show Traffic Trends

A few of the states have performed origin and destination studies of their highway traffic. This information is of the greatest value to the potential motel investor. Many locations which at first appear to be highly desirable lose a great deal of their attractiveness when these statistics indicate that the location is more, or less, than a normal day's drive from the most important point of origin, or only two or three hours' drive to the most important destination point. A normal day's drive will vary with the region. In mountainous or scenic areas it may be as little as one hundred and fifty miles. In some of the level, sparsely populated areas it may be five hundred miles or more. The normal day's drive can best be determined through acquaintance with the region in question.

Comparison of these traffic flow maps and origin and destination studies over a few years will indicate any existing traffic trends. If travel into the region is declining, the location should be avoided.

If the investor does not plan to offer food service in conjunction with his motel, he should be sure to choose a site convenient to a good restaurant. Surveys show that one of the most important factors influencing travelers' choice of one motel over another is the convenience to a restaurant. The availability of automobile service is also very important, since almost all motel patrons travel by car.

Other Factors in Choosing Location

Of course, a location might be favorable in the light of all these factors and an ideal site available at a fair price, without warranting an investment. Some otherwise desirable locations have been overbuilt – that is, the supply of rooms is greater than the usual demand for them. If this be the case, the occupancy rate will be low regard-

less of the form and beauty of the architecture and the number of desirable facilities offered.

A good indication of the need for additional accommodations is the time of evening that the "No Vacancy" signs begin to appear at the existing motels. If they usually do not appear before 10 or 11 P.M., the area is not in great need of more rooms. If a check with the local association of motel operators reveals a low annual occupancy rate, there certainly is no justification for investing in either a new motel or one of the existing establishments unless the location is in a seasonal business area and unusually high room rates are obtainable during the season.

If there is an actual shortage of accommodations in the area, or if the existing motels show an unusually high occupancy rate, then a new motel, well planned and well situated, will probably succeed because business tends to gravitate to the newer places.

The size of the new motel should be determined by three factors: (1) the need for additional rooms, (2) the proposed operating policies of the owner, (3) the capital available.

The number of rooms for a new motel should be determined by the degree of need for additional accommodations. Most travelers seek accommodations between the hours of 4 and 8 P.M. The time that other motels begin to fill should serve as a measure of the extent of need. Allowance should be made for the added attraction that a newer place holds for the public. Also worthy of consideration is the fact that larger motels appeal to motorists more strongly than smaller ones, and a motel of twenty-five to forty units will enjoy a much higher occupancy rate than a smaller court.

The number of employees an operator expects to hire is another determinant of the proposed motel's size. If the owner and his wife plan to operate the place alone, ten to fifteen units will be all that they can care for. Two maids can clean about twenty-four to thirty rooms, depending on the layout. In planning the number of units, careful consideration should be given to the number of employees required for efficient operation.

Available Capital Governs Size

The capital available for investment is, of course, the decisive factor in the size of the new motel. Guests are demanding more

and more facilities and top rates can be obtained only if these wants are satisfied. Unless the investor can afford to build a first quality motel that will command top room rates, he would probably do well to purchase an older, established motel with a profitable background rather than build a second-best place requiring lower rates and smaller profits.

The capital investment in a motel should be related to the traffic volume passing its driveway only in the general sense pointed out in considering factors that indicate favorability of a site. Real estate values, construction costs, and all other costs governing the appraisal value of a motel, vary from region to region. Motels of comparable size, construction, and guest facilities in Sacramento, Abilene, Atlantic City, and Miami will all represent investments of various amounts.

The investment required for either a proposed or an existing motel within a particular locality should bear a certain relationship to the profit expectancy of the establishment. However, this ratio will vary in different parts of the country. Some investors will prefer to accept a smaller dollar return on their investment and live in a certain area, than they might receive in other areas.

Many motels in the highly publicized resort regions earn a smaller annual investment return than motels in other places because of the seasonal influence on occupancy in resort areas, compared to the year-round business of the non-resort areas. This difference in ratios of income to investment can only be considered as the price the investor is willing to pay to live in the more glamorous location. The ratios for the several areas can only be learned through study of the income performance of leading motels in each vicinity.

Occupancy Rate and Replacement Costs

The national occupancy rate for the last several years has ranged from seventy to seventy-five percent. An occupancy rate of seventy percent is generally considered necessary for a satisfactory profit. The average breakeven point is somewhere around sixty percent, but some courts can survive with a fifty percent, or slightly less, occupancy rate if they are unusually well planned and managed; or have a small capital investment and obtain higher than average room rates (notably resort operations). The occupancy rate is deter-

mined by multiplying the number of a motel's rooms by 365 days and dividing the result into the total number of rooms rented during the year.

Investment in motel property should never be made on the basis of replacement cost new, less depreciation, without carefully considering whether investment on this basis would produce proper returns. Although a close relationship usually exists between the motel's age and state of repair and the room rates that it will produce, its location, extent of guest services offered, and the amount and type of competition will strongly affect both the rates obtainable and the occupancy ratio enjoyed. The investment should be such that the average room rate realized will equal $1.25 to $1.50 per $1,000 cost per room.

Motels are speciality type properties – they can be used for only one purpose. Aside from their profitable operation as motels, their only worth is the real estate value of the land and the salvage value of the building materials. Therefore, since the primary objective for building or operating a motel is earning income, the best criterion is to base the investment upon reasonably expectable profits. One eminent authority advocates that the investment not exceed two and a half to three times the annual room sales. Since the percentage of operating profit (before depreciation, interest, and taxes) tends to be about the same regardless of rates, this will apply to all types of motels.

Probably the most acceptable method for calculating the investment limit in a motel property is to capitalize the expected net profit. Investigation of the financial status of numerous successful operations shows that net profits run from seven to ten percent of the investment. Any smaller return would fail to offer the operator compensation for his time after allowance is made for the return realizable from a like investment in a sound corporate stock.

Financing a Motel Investment

A statement of expected profitability should be projected for the motel. This will be based upon the occupancy rate for the area (conservatively, not in excess of seventy percent); the average room rate obtainable; the capital expenses (depreciation, taxes, insur-

The motel in the picture, La Sands Western Hills Hotel, is situated at Bossier City, Louisiana.

ance, interest, maintenance, etc.), and the expected operating expenses in the particular location.

The true economic or earning value can be determined by capitalizing this reasonably expectable net profit at seven to nine percent. To this figure add twenty-five to thirty percent of the appraised value of the manager's quarters (as a fair rental value) and the results will give the maximum advisable investment. Any downward adjustment indicated by the appraisal value should be made. No upward adjustment to a higher appraisal value should be considered unless some definitely known factor will increase the profitability within a reasonably short time.

Money-lending institutions hold rather conservative policies on motel financing. Banks are restricted by Federal Reserve Act requirements on loans on a real estate basis to maturities not in excess of ten years and for an amount not exceeding sixty percent of the appraised valuation of the real property. Bankers usually limit motel loans to fifty percent, and sometimes only forty percent, of appraised value.

Insurance companies and savings and loan associations are less restricted than commercial banks and frequently can grant longer terms for repayment. Insurance companies have invested increasing amounts in hotel and motel mortgages in recent years; therefore, probably they should be the first source from which to seek loans. The usual term is from twelve to fifteen years with twenty to twenty-five years granted for the more elaborate highway motels. Corporate enterprises may obtain financing for longer periods through the sale of bonds to private investors.

In addition to approximately half of the capital investment, the prospective operator should have sufficient cash reserves to carry him over an unprofitable period of several months. One does not simply build a motel and immediately begin collecting profits. Even in the purchase of a going concern the revenue is likely to dip with the change in ownership.

The new operator may find that he prefers supplies and equipment not used by the former operator, or plan to operate under different policies. All these elements affect the revenue of the initial period. For the sake of safety, the investor should have a cash reserve on hand equal to five percent of his investment in an estab-

lished motel operation and at least ten percent of the investment in a new motel.

If this discussion seems fairly conservative, it is principally because so many ignore due conservatism in their conception of the motel industry. But there is no need for pessimism. The motel industry has a bright future. It has not yet neared its peak.

It is easy to enter the field. A relatively small amount of capital is required. But a proper amount of care is advisable. This is a highly competitive industry that requires careful planning and hard work to realize success. Factors that appear minute and unimportant to the layman are often critically essential to the measure of success to be enjoyed.

A sound financial structure that can withstand business fluctuations is fundamental. Capital expenses such as depreciation, taxes, insurance, and interest are determined at the time of investment. They cannot be reduced at a later date. The greater they are, the less likelihood exists that the individual establishment can withstand a decline in occupancy. And the fact that the occupancy ratio and the average room rate tend to decline at the same time multiplies the danger inherent in a poor capital structure.

This discussion has dealt principally with the transient motel. The downtown motel, the resort-type terminal motel, and the community hotel built along motel-type architectural lines and offering complete hotel services, all represent different facets of the hospitality industry having problems and governing factors peculiar to their particular areas. But the true, long-range profitability of all types of motels, as well as any other type of business enterprise, is dependent upon a carefully planned capital structure. A well-planned investment must be tenable in slack periods as well as in flush periods.

There Are Better Years Ahead For Toll Road Financing

GEORGE J. GRUNER

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THE issuance of revenue bonds to finance capital expenditures of state and local governmental functions is becoming more popular each year. Although it is a means of avoiding debt limitations, it does subject the function so financed to a public scrutiny of its economic feasibility prior to and after the financing as well. It also subjects the management of such enterprises to constant public appraisal.

A sizeable portion of all the revenue bonds issued is made up of toll road bonds. Over four and one-quarter billion dollars in par value of bonds have been issued to pay the cost of approximately 3,000 miles of toll roads already built or under construction without recourse to federal aid or special taxes. Most of these bonds are now outstanding in the hands of the investing public.

The concept of toll roads is not new. History reveals that such roads existed in the pre-Christian era, and in this country as early as two hundred years ago. Thus, the "User Pay" concept is an old one. It is only natural that this concept reached full bloom as the result of phenomenal growth in motor-vehicle use, that it accelerated the construction of these modern commercial arteries, and that in the process it saved the respective states billions of dollars.

In 1956, however, the market for outstanding toll road revenue bonds suffered rather severely, and the issuance of some two billion dollars of bonds to finance additional roads then on the planning boards was abandoned or deferred. What were the conditions that contributed to the market decline of toll road securities and their subsequent unpopularity, and what is the future outlook for financing additional toll road facilities?

Despite occasional unsuccessful attempts in recent years to finance toll roads on a private basis and resort to a corporate form of financing, the toll road bonds now outstanding as a class are issued by duly constituted agencies of state or municipal governments, and the interest on such bonds is presently exempt from all federal income taxes under existing statutes and court decisions.

During the last two years, the tax-exempt market has fluctuated widely. The Dow Jones Weekly Municipal Averages (a basis valuation of bonds with an average coupon of 4.16 percent), which move inversely to price, recorded a level of 2.44 percent during the spring of 1956. By the end of that year the averages were at 3.25 percent, and by August of 1957 the averages had moved to 3.58 percent, indicating that interest rates on tax-exempt securities had increased approximately 47 percent within the short space of less than eighteen months. In terms of dollar prices per bond, and assuming a three and one-half percent bond maturing in forty years, a 1.14 percent increase in basis yield is equal to a loss of approximately $208 per $1,000 par value bond.

Factors in Bond Market Decline

Coincidental with the falling bond market were the disappointing initial operating results of certain facilities in comparison with the original engineering forecasts, coupled with the growing fear that the Federal Highway Act would enable the construction of competitive free roads, thereby discouraging toll-facility use to the detriment of the security of the toll road bond.

Another confusing factor for both issuer and investor was the evident change in professional opinion which now places more emphasis on the economic potentials of short-haul traffic and less reliance on long-haul or terminal-to-terminal traffic. This change of opinion came about because the average length of a turnpike trip is gradually decreasing.

Because of the relatively limited operating experience of major toll road facilities, it will probably be some time before definite earning patterns emerge and confidence is restored to the investor. Present indications are that many investors now look forward to the federal highway program as a solution to current ills. Feeder

roads constructed under such a program would give real impetus to the generation of traffic volume and the channeling of traffic flow toward the toll facility. Toll roads designated as part of the federal highway system may conceivably become the beneficiaries of federal subsidies in one form or another.

The sharp drop in market prices is an important factor in the current unpopularity of toll road bonds as an investment medium – even though the price decline was largely due to the changing pattern of interest rates. This change would not have been too serious had initial operating results been more spectacular or compatible with original estimates, and had construction and operating costs not got out of hand in certain instances.

All of these factors have led many investors to believe, mistakenly, that the discount, or price below par at which the bonds are selling, is solely a reflection of the degree of security present in the bonds and that if the bonds were any good at all they would be selling at least at one hundred cents on the dollar regardless of the interest rate at which the bonds were originally marketed. Actually, it is questionable whether toll road revenue bonds as a class fared any worse than other sections of the bond markets.

Furthermore, many people lose sight of the fact that when most turnpike bonds were originally marketed, they bore a rate of interest higher than those of seasoned projects, not only because the huge financings necessitated tapping a broad and extensive market not primarily interested in tax-exempt income, but also because additional compensation had to be paid to the investor for the risk inherent in the untried venture.

Outlook for Future Financing

What is the present outlook for future toll road financing, assuming, of course, that the project has a basic and adequate economic justification?

First of all, there is no such thing as a free highway. Every road is paid for and maintained by the people either through the direct taxation of property and income, or by levies on fuels, licenses, etc., that enable or allow the motor vehicle to use the road, or by a direct toll charge for the use of the facility.

Second, the manner in which such projects can be financed depends upon the condition of and the level of the bond market at the time of financing. While borrowers are always competing for capital, under tight monetary conditions or credit restraint the issuers of bonds desiring to attract capital in large sums must expect not only to pay a higher rate of interest, but also must expect more stringent security requirements.

Conversely, in an easy money market, not only is the interest rate less, but the test of economic feasibility is less stringent because the lower interest rate results in lower annual cash requirements to retire the debt. It is true that under a given set of circumstances, the economic security factors of a bond increase as the interest rate is lowered; but it is also true that the interest rate cannot be lowered below the level at which equally secure bonds are generally available, and under such circumstances the additional factors of economic security must be provided from other sources.

In the case of toll roads, the greater degrees of security may take the form of better coverage multiples of debt service requirements; guarantees by the parent state as to debt service or as to interest payment alone, or as to maintenance and operating expenses; by subsidy of construction costs; by the contribution of feeder and approach roads; by the pledge of as much state gas tax or license revenues or such other devices or combinations thereof as may be necessary to attract market acceptance of the security at the lowest possible rate of interest.

For example, the mammoth New York State Thruway Authority has outstanding two issues of general revenue bonds aggregating $350,000,000, secured by a pledge of the turnpike revenues. The Authority also has outstanding approximately $400,000,000 in bonds and notes fully guaranteed as to principal and interest by the State of New York. Obviously, the guaranteed bonds carry a lower rate of interest than had they been issued as revenue bonds. There is no pledge of the revenues for the guaranteed obligations, but the Authority expects that sufficient revenues will be available not only to satisfy the obligations of the general revenue bonds but also to provide funds for the payment of principal of and interest on all of the guaranteed obligations without resort to the guaranty by the state.

The Pennsylvania Turnpike Commission, with approximately $450,000,000 in bonds outstanding, has in the past combined various sections of its turnpike system for financing and security purposes. The State of Oklahoma helped its Turnpike Authority when it constructed approach and feeder roads at its own expense.

Two Recent Turnpike Bond Issues

In the spring of 1954, Connecticut borrowed its first $100,000,000 of approximately $400,000,000 required for constructing its Greenwich-Killingly Expressway. It pledged as security for the bonds the tolls and other revenues of expressways financed under the Act; the receipts from motor fuel taxes would be called upon only in case of deficiency in revenues or reserves.

In making receipts from the motor fuel taxes available, the state did not then expressly covenant to continue the imposition of such taxes or to maintain the then present rate of taxes. Subsequently, the Connecticut General Assembly granted to the holders of the first series bonds the opportunity to make their bonds an exclusive first charge on the gasoline tax and requested the bondholders to permit highway fund revenue bonds to become a charge on the gasoline tax ratably with the charge of the remaining turnpike bonds and bonds for other expressways. The bondholders consented to this proposal, and under these conditions, the second series of $100,000,000 expressway bonds were sold in April, 1956.

However, plagued by a generally deteriorating bond market, the state had to revise upward its interest rate limitation on the issuance of bonds so that the third series of $50,000,000 could be marketed in the spring of 1957. In May, 1957, the state legislature provided that up to $150,000,000 of the total $397,000,000 authorization could be issued as general obligations of the state. Because market conditions were not better during the summer, the state then sold $35,000,000 fourth series bonds as general obligations for which the state pledged its full faith and credit. By November, 1957, the market had improved sufficiently to enable the state to market its fifth series in the amount of $35,000,000 as revenue bonds identical to the second and third series bonds.

Another state to feel the disrupting effect of a declining bond

market as well as disappointing initial operating results was Kansas. The Kansas Turnpike Authority, having already issued some $160,000,000 in bonds, was faced with borrowing $19,500,000 in the summer of 1957 to provide funds for an expressway between the center of Kansas City, Kansas, and its residential areas in Wyandotte and Johnson Counties and as an arterial route to the Kansas Turnpike.

To make the bonds marketable, the Authority not only pledged the net revenues from the facility, but also, under the terms of a contract with the State Highway Commission of Kansas, such amounts from the state highway fund as might be necessary to remedy any deficiency in the net revenues of the project. This pledge was most reassuring to the potential investors inasmuch as the total estimated amount available in the state highway fund for such requirements for the fiscal year ending June 30, 1957, was more than twice the total face amount of the $19,500,000 issue.

In all cases, the "User Pay" concept was preserved as the basic security, and the added inducements to potential investors were the frosting on the cake needed to make the issues readily saleable under generally adverse market conditions and at the lowest possible interest cost.

Toll Roads Are Big Business

Except for the rare and relatively short-lived periods of extreme strain in the financial markets, there is little question that capital is available in sufficient quantities to finance economically conceived and properly constituted projects. This includes toll road revenue financing as well as issues for other revenue projects for electric, gas, water, and sewer purposes.

At some point, prevailing interest rates may also exceed statutory or economic limitations; but in such circumstances and with a real desire to get the job done, the parent state can lend a helping hand by amending the statutes and by subsidy. Since the toll authority is operating solely in the interest of the parent state, it is entitled to receive all the co-operation necessary to achieve its objective. From the investor's point of view this close co-operation is just as essential as are the continuity of good management and freedom from political interference.

History was made with the huge volume of turnpike financing, but perhaps more important history is being made at the present time, for the turnpike business is big business–a multi-billion-dollar business. The toll agencies can contribute much to inspiring the confidence of the investor. Good management is essential not only because the public has the right to look to the toll agency for initiative, efficiency, and enterprising business management, but also because the toll agency lives in a glass house and any suggestion of lack of honesty or good judgment has a far-reaching effect on the taxpaying as well as the investing public. What these managements do now, what programs they undertake to operate and maintain facilities, to develop traffic and future revenues, will have a most telling effect on the manner in which similar projects will be financed in the future.

Every effort should be made to dispel needless doubts and fears and to encourage understanding of the basic problems and experience of toll facilities. Recognizing this fact, the Investment Bankers Association of America and the American Bridge, Tunnel and Turnpike Association jointly appointed a liaison committee to promote a closer relationship between the investor, the issuer, and the banker. Management can and should keep the investors fully informed as to progress made by each facility; reports should give sufficient information to demonstrate clearly the character, quality and intelligence of the people responsible for the success of each project.

Full Reports Essential For Investors

A more fully informative and standardized system of reporting should be established so that common yardsticks may be developed for the edification and benefit of both the investing public and the toll industry. Such reports could and should be made frequently, preferably monthly, beginning immediately after financing of the project. Monthly progress reports during the construction period are as essential as are full and factual reports on the degree of completion when the facility is open for traffic.

Pointed disclosure should be made of any capital items postponed either for lack of construction funds or for conserving construction funds for other purposes, including interest reserves. When the facility is open and in operation, complete reports of use,

categories, and revenues are essential; also, full and complete reporting on any items of unusual or deferred maintenance.

Bankers constantly hear whispers that some authorities on occasion forget to report all of the facts. Figures are, of course, important; but equally important to the investor are management commentaries on the progress during the preceding period, with full explanation of any unusual circumstances materially affecting the figures or their interpretation. Full and complete annual audits, together with analytical comments and engineering reports when available, should be widely distributed. Publicity should be given to operating budgets, and how they compare with actual results.

A facility system of origin and destination studies, continuous in nature, could be of inestimable value to the management team in studying traffic trends and in determining the value of a trip for possible toll schedule revision. While this suggestion would not replace the value and work of professional traffic engineers, such a system could provide information for the use and benefit of all interested parties.

Comprehensive advertising campaigns should be undertaken to inform the driving public as well as the investing public of the advantages of turnpike travel: how much time can be saved; how much operation expense might be reduced; the variety of trips available between intermediate points. Better maps could be distributed widely, and generally better ingress signs would be helpful to the average motorist.

Turnpike business is big business, and it is good business to advertise the product.

Highways, like railroads, provide a medium of transportation and in themselves create commerce and industry. They constitute an important part of our national economy and contribute greatly to the enhancement and preservation of our economic and political way of life. It would be economic and political waste to abandon a concept so widely accepted by the motoring public as fair and sound.

The ability to finance future toll road facilities has not been lost during the last two years. In fact, that ability has been materially strengthened because market and economic conditions have stripped the industry of its rosy hue and have emphasized the fundamentals of sound economic and political finance.

A Guide to Transportation Planning

GLENN C. RICHARDS

Mr. Richards is Commissioner of Public Works for the City of Detroit, Michigan. He started his career with the Florida State Road Department in 1924 and served with the Michigan State Highway before becoming Commissioner for Detroit in 1944. He served as consultant to the Clay Committee in the preparation of the report of the nation's highway needs. From 1954 through 1957, Mr. Richards was chairman of the National Committee on Urban Transportation. At the present time he is chairman of the Highway Committee of the American Municipal Association and a member of the executive committee of the Highway Research Board.

MORE than two-thirds of our population lives in cities and urban areas, and within the last decade 95 percent of our total population growth has taken place in or converged upon cities and their suburbs. While this rapid growth of cities and their metropolitan areas generated many problems, the one most obvious is that of local transportation.

But this is only the beginning. Current predictions point to a national population of 200 million – possibly 225 million by 1975. If present trends continue, there can be only one result – the urban traffic and transportation problems of the future will be enormous by any measure of past experience.

The magnitude of such anticipated future growth, together with its potential impact on existing urban transportation systems, became alarmingly clear with the first wave of post-war expansion. Faced with the necessity of providing immediate relief measures and preparing plans for long-range improvements, municipal officials everywhere began discussing ways and means to solve their traffic and transportation problems. As a result, these problems and their complexities were explored either formally or informally at all conferences, conventions and meetings at which public officials were gathered.

From the beginning of these discussions, it was clear that any practical solution would have to be broad in scope and geared to the objective of improving all forms of local transport – cars, trucks and transit vehicles. A new approach would be necessary.

This approach would have to include much more than the limited programs and hit-or-miss efforts extended grudgingly in the past.

It was evident that only a well-organized transportation planning program based upon adequate facts and information could solve the problems. Past experience indicated that special purpose studies, carried out in piecemeal fashion, would not provide the necessary answers.

In following this broad approach, it was discovered that most cities do not have the necessary facts and information to define and evaluate the extent of their particular problems. Lacking such data, they are not in a position to project future needs on a realistic basis. Furthermore, few, if any, cities have a systematic and economical way of collecting all of the basic data necessary to carry out a sound transportation planning program on a continuing basis.

National Committee Guide Manual

With these observations in mind, the representatives of six national organizations of public officials organized the National Committee on Urban Transportation in May, 1954. These are the International City Managers' Association, the American Municipal Association, American Public Works Association, American Society of Planning Officials, Municipal Finance Officers' Association, and the National Institute of Municipal Law Officers. The Bureau of Public Roads accepted membership shortly after the committee was organized, and in 1956 the National Association of County Officials and the Canadian Federation of Mayors and Municipalities became members.

The first objective set by the committee was the preparation of a manual of methods and procedures by which cities could undertake a complete fact-gathering program to help officials evaluate deficiencies, project future needs and formulate a more realistic transportation policy. To accomplish this objective, the work program was divided into logical categories and assigned to nine subcommittees, staffed with more than one hundred and sixty outstanding specialists selected from city, county, state and federal governments and from universities and consulting fields.

A preliminary manual was completed early in 1956 and in

March of that year seven pilot cities were selected to field-test the methods and procedures developed. These pilot cities are San Diego, California; Syracuse, New York; Phoenix, Arizona; Albuquerque, New Mexico; Pocatello, Idaho; Detroit, Michigan; and Oak Park, Illinois.

As a result of pilot-city experience, study techniques were improved and adjusted to provide additional guidance in organizing and carrying out an effective fact-finding and transportation planning program. The first completed work of the National Committee – consisting of a basic guide manual and an initial series of procedure manuals – was published in January, 1957 by the Public Administration Service.

The guide manual, *Better Transportation For Your City*,[1] is a brief document designed for use by public officials such as mayors, city managers, councilmen, state highway engineers, transit officials, department heads and interested citizens as well. It presents in simple, direct style how the program should be organized, the studies to be carried out, the work to be done and the sequence in which it is to be accomplished. The procedure manuals are designed for technicians and field personnel to use in carrying out each of the detailed studies recommended.

The National Committee's program is divided into six basic stages: 1. Organizing for the Job; 2. Getting the Transportation Facts; 3. Defining the Problem; 4. Preparing the Plan; 5. Adopting the Preferred Plan and Financial Program, and 6. Putting the Plan to Work.

Stage I. Organizing for the Job

A sound transportation planning program does not come about by chance: it must be organized and developed to meet the specific overall objective of improving all forms of local transportation. Organization of the program in the initial stage may well be its crucial point because it involves legislative approval of the program, establishing technical co-ordination and developing public support. It is in this first stage that the scope of the program is defined, the

1. The chart shown in Figure 1 is reprinted from the guide manual, *Better Transportation for Your City*, published by the Public Administration Service, 1313 East 60th Street, Chicago 37, Illinois.

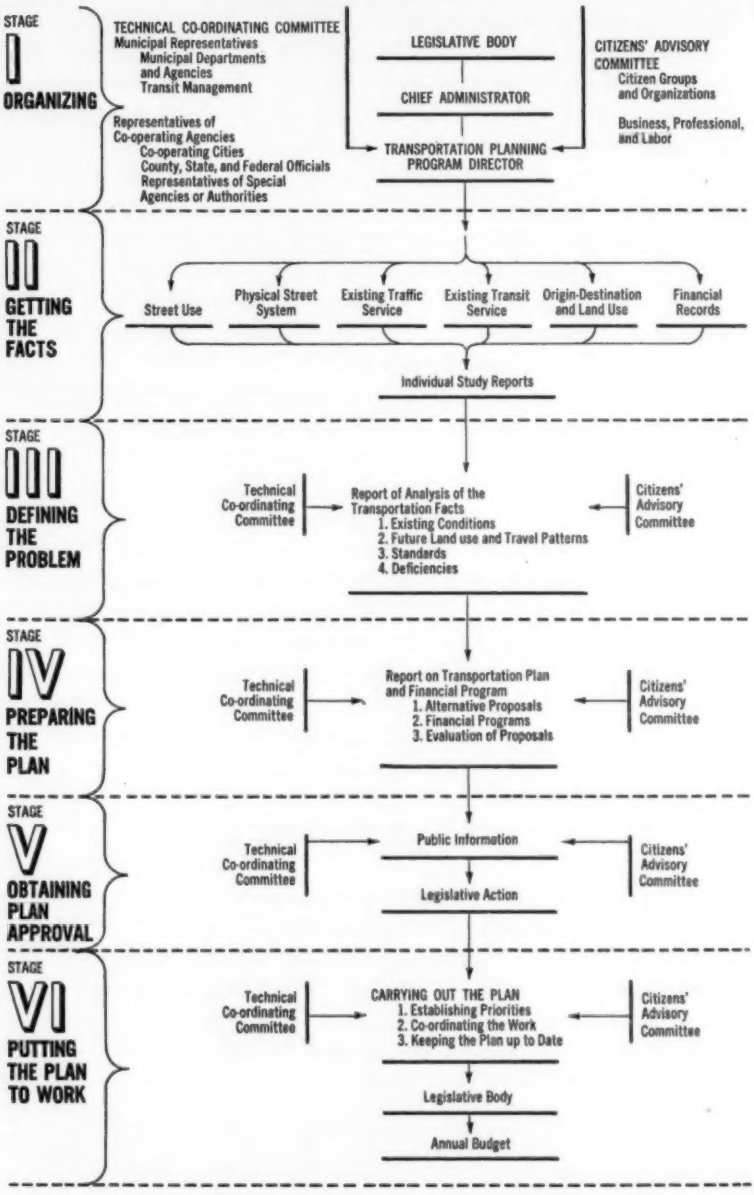

Figure 1. Establishing a Transportation Planning Program.

respective roles of co-operating agencies fixed, and specific work responsibilities are assigned. For this reason, organization is given particular emphasis.

The general plan of organization recommended for carrying out a full-scale fact-finding and planning program is outlined in Figure 1. The central working organization is a Technical Co-ordinating Committee. Represented on this committee should be all agencies and departments having a local transportation function, including municipal departments, transit management, county, state, and federal officials, and representatives of co-operating cities, agencies and authorities. To complement this group it is recommended that a Citizens' Advisory Committee (or committees) be appointed and brought in at the formative stage of the program to cultivate public understanding and support.

The technical co-ordinating committee as shown is headed by a program director. In the larger cities this function will undoubtedly require the appointment of a full-time administrator to co-ordinate the program and keep it moving. In smaller communities, the director might logically be the planning director, the director of public works, city engineer, or traffic engineer. In any event, it is important that the director be allowed to devote sufficient time to his immediate responsibilities to assure co-ordination of effort and successful prosecution of the program to be undertaken.

Stage II. Getting the Transportation Facts

After organizing the overall program to be undertaken, the next step is to gather the factual data necessary for reaching planning and operational decisions. This stage includes the following studies: 1. Street Use; 2. Origin-Destination and Land Use; 3. Existing Level of Traffic Service; 4. Existing Level of Transit Service; 5. Inventory of the Physical Street System, and 6. Financial Records and Reports.

1. Street Use

This should be the first study undertaken, since the concepts and general designations developed are basic to other studies in this stage – particularly traffic service, the inventory of the physical

street system, and financial records and reports. The objective of this study is to identify each street according to its present use. This first working designation is based on the concept of street classification by function, and it is recommended that all streets be assigned to one of four categories: (a) expressways, (b) major arterial streets, (c) collectors, and (d) local streets. When this general concept has been developed and first assignments by street-use category have been made, other parts of the fact-finding program can be undertaken. A procedure manual has been developed to guide cities in reaching these initial determinations.

2. Origin-Destination and Land Use

Knowledge of the daily origins and destinations of people and goods is a prerequisite to an understanding of the complex movements into, within and through cities and metropolitan areas. The origin-destination survey is designed to provide the basic data from which existing movements can be obtained and future movements projected.

The information developed is necessary to determine the total number of trips, the mode of travel used and the time of day the trips are made. These data, compiled through interviews and questionnaires, are the source material for projecting future travel and for estimating future deficiencies in street, highway, and transit service. The data will also be valuable in locating and designing expressways, major streets, bridges and transit facilities, as well as arranging transit routes and schedules.

To project traffic patterns with reasonable accuracy, it is necessary to determine the relation between land uses and traffic generation. In short, both existing and anticipated land use in a given city or metropolitan area provides a basis for estimating future travel patterns. It is recommended, therefore, that a land use plan should logically precede or parallel the entire study program to develop the necessary factual linkage between various land uses and traffic generators.

If a community has not completed an origin-destination survey within the last ten years, it is recommended that one be undertaken as soon as possible. Methods for carrying out origin-destination surveys range from the simple external cordon survey in small

communities, to the comprehensive external cordon-home interview survey for the larger cities and metropolitan areas. The procedure manuals prepared to date cover all of the fact-finding phases for these types of surveys.

3. Existing Level of Traffic Service

An authoritative appraisal of existing traffic services requires an adequate basis in fact. To provide this factual base, the following studies should be carried out and kept up to date: Traffic Volume Counting; Travel Time; Street Capacity; Accident Records; Parking, and Traffic Control Devices.

All of these investigations fall within the province of the traffic engineer or, in smaller cities, to that department charged with these responsibilities. Because some of the listed studies are already being carried out in many localities, most cities will not find it necessary to implement the entire series as new work.

The procedure manuals present a specific schedule of frequency for each of these studies; first, because it is necessary to keep the information up to date, and second, the data to be assembled will have greatest value if collected over a period of time. For example one screen line count is not in itself significant, but if carried out over a period of years, valuable information can be gained.

Vehicular volume information is a basic element in studying the existing transportation system both as a quantitative and qualitative measure of the level of service. Volume information is necessary for reaching day-to-day decisions as well as projecting long-range solutions. It is essential to determining capacity deficiencies, computing accident rates, developing travel-time indices and warrants for traffic control measures. Traffic volume data also provide the framework for the more comprehensive studies of parking needs and origin-destination analysis.

The sustained collection of data for all traffic service studies recommended is relatively inexpensive and pays many dividends. By keeping such information up to date, trends in traffic movement and many other factors will be registered as they occur and will not remain to be discovered in special purpose studies. Procedure manuals prepared for this traffic-study series outline in detail the methods and techniques for gathering and developing the informa-

tion required. The data obtained in these studies can be standards presented in a separate procedure manual, discussed under Stage III.

4. Existing Level of Transit Service

A primary objective of the National Committee is a balanced system of transportation facilities and services that uses each form of transportation to the best possible advantage within a given community or metropolitan area. To accomplish this objective, transit information must be compiled in a form that will permit analysis and use in conjunction with other pertinent traffic and transportation data being developed.

The procedure manual outlines how the following studies should be carried out: Routes and Coverage; Transit Route Inventory; Passenger Load Data; Service Frequency and Regularity; Passenger Riding Habits; Transit Travel Time; Transit Speeds and Delays; and General Operating Data.

These studies have been designed not only to provide transit management with a sound technique for recording present service in terms of efficiency and economy, but also to provide the factual data necessary for integrating transit service with the objectives of urban planning and for developing an overall transportation policy.

As in the case of traffic service studies, each investigation is periodic in character and a suggested schedule of frequency is included. Data accumulated over a period of years will become increasingly valuable and can be compared with standards and general guides presented in a separate procedure manual discussed under Stage III.

5. Inventory of the Physical Street System

The successful operation of any business enterprise depends to a great extent upon up-to-date information about its physical plant, equipment and capital assets. While most cities have facts available concerning their street systems from various departments and sources, rarely is the information compiled in one place and in a form that facilitates use for planning purposes.

Items recommended for such an inventory include curb-to-curb and right-of-way widths; pavement types, age and condition,

riding quality; condition of sidewalks, curbs and gutters; location and size of storm and sanitary sewers; type of street lighting, and other items. Similar information on railroad grade crossings and all other structures including bridges, viaducts, tunnels and grade separations is also gathered. The data collected in this inventory are valuable in determining street improvement needs, preparing short-term and long-range improvement plans, and maintenance budgeting.

6. Financial Records and Reports

Few, if any, cities have summary records of revenues and expenditures specifically oriented to help local governments develop overall transportation policy, or to review existing practices and work programs. The objective of this study is financial information that will be valuable for transportation purposes if collected and kept current on a uniform continuing basis. A procedure manual and summary report forms are available to guide the collection and analysis of the basic information required.

The financial data to be gathered cover all phases of transportation including summaries of revenues, non-revenue receipts and expenditures pertaining to both general facilities and public service enterprises, investment in fixed assets, indebtedness, and related statistical data. Collected and analyzed on an annual basis, this information will reveal transportation expenditures, by purpose and facility, and total transportation costs. Armed with this information, legislative and administrative officials will be in a position to evaluate existing fiscal policies more objectively, and thereby facilitate decisions with respect to demonstrated transportation needs.

Stage III. Defining the Problem

When the fact-gathering studies outlined in Stage II have been completed, the technical co-ordinating committee can proceed to define the transportation problem. In approaching this stage, care should be taken to consolidate the basic data collected to make sure all related and available information is presented in proper form and placed in perspective as outlined in the Guide.

In brief, defining the problem consists of four broad steps: (a)

reviewing existing conditions, (b) projecting future conditions, (c) adopting standards, and (d) determining present and future deficiencies. A review of existing conditions should be carried out by the co-ordinating committee by using the data collected in the fact-finding stage, properly prepared for presentation.

When existing conditions have been reviewed, future demands must be considered, since both existing and future needs must be defined before an adequate plan for improvements can be developed. Because travel projection is by necessity a forecast, it is at best only a reasonable estimate of what the future may hold. Complicating the preparation of such estimates are many unstable factors such as future land use and development, population growth, variations in the elemental transportation costs, and the level of economic activity, as well as work hours and personal habits.

Generally speaking, research indicates that travel patterns are governed by three basic elements–land use distribution, transportation facilities and living habits. Naturally, these factors are interrelated and cannot be considered from an individual standpoint. Therefore, it is recommended that information concerning existing and future land use and other related factors be obtained so that reciprocal values and influences can be brought into focus and thereby permit the best forecast attainable.

To measure present and future deficiencies, a set of standards is important for evaluating current and future transportation service. To meet this need, the National Committee developed two procedure manuals that present general standards and guides, against which facts can be measured. One covers recommended standards for street services and facilities, and the second, recommended standards for transit services and facilities.

The standards and guides referring to street services and facilities are based on the minimum level of service to be performed by each street system – expressways, major arterials, collectors and local streets. The yardsticks for measuring the service over each street system are presented in terms of operating characteristics such as travel time and accident rates. Also included are minimum standards for geometric and structural design.

The guides and standards for transit services and facilities cover routing, loading, frequency of service, frequency of stops, operating

speeds, schedule adherence and extensions into new areas. When the information developed for existing transit service in Stage II is compared to these standards and guides, an objective evaluation of existing transit service can be made. These standards and guides can also be applied to project the type and quality of service to be provided in the future.

Stage IV. Preparing the Plan

After evaluating the level of existing transportation service, both street and transit, and projecting future needs, the next step is an overall transportation plan.

Transportation plans and improvement programs are closely related to the basic elements of urban development. Therefore transportation plans must be a functional part of the overall city or regional plan. As such, the transportation plan must take into consideration and reflect existing and future land use patterns, urban renewal programs and all other basic aspects of community improvement. This related planning again emphasizes the need for fundamental co-ordination among all departments and agencies of government, especially between the planning agency and all other members of the co-ordinating committee and the citizens' advisory committee.

In smaller communities it may be readily apparent from available facts that certain plans or solutions have distinct advantages over others. In larger cities and metropolitan areas direct solutions will not be as obvious and it may be necessary to prepare alternative plans. Basically such solutions might include these primary approaches: (a) predominantly public transit, (b) public transit-automobile, and (c) predominantly automotive. And in specific instances, there might be alternatives within these broad classifications.

In approaching alternative solutions the co-ordinating committee should first determine what the essential needs are and how they may be met. From the review of existing level of traffic and transit service and conditions and the knowledge of present and future deficiencies, it will be possible to advance certain general proposals or plans. It is important that such preliminary plans

include not only those improvements which are a local responsibility, but also those involving other levels of government. This is especially true of projects to be included under the federal highway program.

The Guide outlines the preparation of alternative plans and the tools to be used in arriving at necessary preliminary decisions. After tentative alternative plans have been located on a map or maps, they should be tested to determine whether all projected movements can be accommodated in accordance with established standards for speed and safety. In each case an estimate would be made as to number of vehicles and transit riders that would use the proposed transportation facilities. When estimated trips are allocated to the alternate systems proposed, it will become apparent whether or not a particular plan is adequate to meet anticipated major movements.

When these major proposals have been tested and agreed upon in preliminary, the secondary or lesser transportation needs to fit each selected general plan should be determined. Complementing these major elements would be street widenings, intersectional improvements, and channelizations, to expedite traffic flow.

It may also be necessary to project long-range programs to repair, reconstruct, resurface or otherwise improve existing facilities. This category should include traffic engineering measures, traffic and truck routing, and traffic controls, all of which must be used to a maximum to permit the classified street system to perform its designated functions in the most efficient manner.

While extension of transit service and new facilities would be considered in preparing preliminary overall plans, improvement of existing services and facilities is of great importance. Items to be explored for improving service are routes and schedules; express bus service; proper parking and turning controls; better location of bus stops and loading bays on expressways, all of which can materially improve transit service.

Preparing the Financial Program

After testing alternative long-range plans and including required minor improvements, the question of financial feasibility remains

with respect to each preliminary plan. Cost estimates are basic to the preparation of any financial program. While preliminary or general plans cannot be used to develop firm costs by projects, such plans can serve for preparing reasonably accurate estimates for the overall plan under consideration.

As recommended in the Guide, estimates that should be prepared and included at this stage concern all cost components of construction, maintenance, operational improvements and administrative overhead. Only in this way can total costs be visualized in relation to a particular proposal and the transportation service it is to provide. Such estimates will also help to clarify the nature and magnitude of the total job ahead, both in terms of physical and operational improvements as well as dollar costs.

The Guide outlines possible approaches and considerations involved in preparing the overall financial plan. If the original fact-finding studies suggested in Stage II have been carried out and the facts analyzed as recommended in Stage III, preparation of alternative preliminary plans should not be difficult for the technical co-ordinating committee.

Stage V. Adopting the Preferred Plan

Every step outlined thus far has been aimed at one objective – a sound factual plan for continuous transportation improvements, designed to gain legislative approval and support for a financial program to carry it out. Accomplishment of this objective depends upon legislative approval which in turn has its roots in public support.

It is of vital importance, therefore, that citizens understand the issues – that public opinion be informed opinion. In most cases, especially in larger cities and metropolitan areas, this goal will require a large-scale program of public information, using every available medium to explain the recommended plan. Strong civic leadership to sponsor and direct the informational program is an important element at this stage.

If the citizens' advisory committee recommended in Stage I has been properly organized and if it has worked with the technical co-ordinating committee from the beginning, the civic leadership

so represented will be aware of the factual base, findings, and significant developments. Thus, the citizens' advisory committee can become the spearhead for the public information program.

The Guide outlines how a public information program should be organized: what media to employ, what questions to answer, and the general data and information to present. Information prepared for this purpose will be equally useful when public hearings by the legislative body are held before the official adoption of a particular plan. Again, if the fact-finding program is followed through as recommended, this important phase can be negotiated with a minimum of difficulty. To have the greatest possible value, the plan adopted should be accompanied by an adequate revenue program.

Stage VI. Putting the Plan to Work

After a plan and financial program have been adopted, plans for activating them must be laid. This process will include such difficult matters as co-ordinating city-county-state programs; preparation of detailed construction plans; acquisition of property; moving of displaced families and business establishments, and provision of temporary detours and service facilities. Above all, this phase will require high-level teamwork and co-operation.

Since there will undoubtedly be many projects to consider, a system of priorities is recommended to make sure that the most important projects from the standpoint of community benefits will be built first. To achieve a sound procedure of priority rating, it is desirable that the co-ordinating committee review all factors in connection with high-ranking projects each year. The continuous fact-finding and analysis program again becomes an important element in these considerations. In arriving at a priority for a specific project, it is essential to consider three basic elements:

1. its importance to the community,
2. its contribution to sound community development, and
3. direct benefits to users in terms of time saving and accident reduction.

The Guide Manual points out how these considerations should be approached, the elements involved and the factual criteria to be applied. After all decisions concerning project priorities have

been made, they should be incorporated in an overall capital improvement program. In this way the transportation plan and its individual projects will become a functional part of the overall community improvement program and will reflect the fiscal policy adopted by the legislative body.

It should be clearly understood, however, that carrying the recommended program through one complete cycle of six stages as outlined will not in itself produce final solutions. Urban transportation is not static – it is dynamic, and no plan can be considered final. Only by placing the data-collection program on a continuing basis, can the plan be re-evaluated to reflect changing conditions.

Improving Transportation Administration

Although a study of transportation administration is not shown in Figure 1, local transportation has become a major management job – one of the most important in the entire field of public administration.

In most cities, the existing administrative structure has been inherited from the distant past, especially insofar as traffic and transportation are concerned. Generally speaking, transport administration developed haphazardly and as traffic problems increased, cities tended to solve them with makeshift expedients. The result has been divided authority, duplication of effort, scattered responsibility and unnecessary waste. Few cities have recognized transportation administration as a function of the first magnitude in the daily life of the community.

To correct these conditions many cities will sooner or later have to make adjustments in their administrative structure if they expect to overcome their transportation problems and provide improvements when they are needed. In these circumstances, it would be to the advantage of almost all cities to undertake an administrative survey to identify problem areas and devise ways of achieving greater co-ordination of effort. This suggestion applies not only to management problems within a particular city, but to relations with other local jurisdictions and higher levels of government as well. The procedure manual describes in detail how to approach such a study, the information to be obtained, and how to analyze it.

To meet the demands of modern urban transportation, cities must have up-to-date legal authority. As in the case of transportation administration, few studies have been made to determine the adequacy of transportation laws. Very often officials are unaware of such deficiencies until they are confronted with legal impediments in trying to carry out a specific project. Deficiencies may exist in several areas, including traffic control, zoning, land acquisition and many others. If these situations are not corrected, urban transportation progress will continue to be seriously and unnecessarily hampered.

Modernizing Laws and Ordinances

But before revisions or adjustments can be effected, the present status of the law must be carefully evaluated. A procedure manual, to help cities make this appraisal, assembles in outline form the law and its substantive elements – local, state and federal – which affect the administrative, engineering and financial aspects of urban transportation.

To facilitate its use, this procedure manual is organized into five major sections: (1) planning, (2) construction of facilities, including right-of-way acquisition and financing, (3) control of their use, (4) enforcement, and (5) metropolitan and regional authorities. Basic laws relating to each of these broad categories are listed with the principal elements of each briefly described.

All background and reference material is based on recommended legislative models, where they exist: the best-known state enabling acts; city charters and ordinances now in effect; and where specific legal guides are not available, authoritative reference documents are listed. Cities in which a review of this kind has not been carried out, will undoubtedly discover areas for taking important and forward-looking action.

Major Benefits of the Program

The National Committee's program corresponds to a blueprint that can be followed to develop a complete fact-finding and effective transportation-planning program. It has many special values and strong points. Some of these are:

1. All departments and agencies having a transportation responsibility or function are brought into partnership from the beginning. This unity will serve to promote teamwork and understanding, not only among departments and agencies of a particular city, but between all agencies at the metropolitan, state and federal levels.

2. The program recommended is flexible and can be used by small, self-contained cities and central cities of metropolitan areas working in co-operation with their suburbs, the county in which they are located, and with state highway departments.

3. It is not a crash effort. It is designed to be a continuing program whereby all necessary data can be kept up to date so that transportation plans may reflect changes in community needs as they develop.

4. Although judgment factors enter into all advance planning decisions, this program will help eliminate guesswork, unwarranted conclusions, and unjustified criticism.

5. The program is calculated to enlist public interest and support from the beginning. Active support of an informed public is essential if any plan is to be approved and adequately financed.

The Guide Manual, with its procedure manuals, constitutes the most complete and authoritative source material on transportation planning ever assembled. The National Committee recognizes that transportation planning and urban development are closely related and that with the passage of time, requirements of cities will undoubtedly change. As more cities carry out factual planning programs, the Committee will draw upon their experience to incorporate desirable adjustments.

A word of caution is in order. Any city contemplating the adoption of this program should realize that to be successful it requires organization, administrative direction and competent personnel. To develop its full potential the program must be established on a continuing basis. Only in this way can all of the program's related and built-in benefits be realized.

Obviously, too, the program must be adequately financed – not for a year or two, but at a sustaining level. However, a city need not bear all of the costs involved. Under the various highway acts, up to one and a half percent of federal funds apportioned to the states is available for engineering and planning purposes. These

funds are available to local governments at the option of the respective state highway departments and subject to the approval of the Bureau of Public Roads.

The nature and scope of any transportation-improvement program will have an important bearing upon all phases of future city development, both public and private. It will determine to a large extent where people will work, live and do business in the future. Transportation facilities of all kinds – whether streets, highways or transit lines – are the framework upon which cities can grow and prosper. Therefore it is important for every city to plan its transportation improvements so they will become a living part of the community development plan.

Under the 1956 Highway Act, huge sums of money will be spent on highway improvements in cities and urban areas. It is essential to spend these funds productively and in accordance with well-developed plans based on accurate factual data. In fact, whether or not a city can take full advantage of the federal highway program may well depend on its ability to document transportation needs.

The National Committee's program has been endorsed by the Joint Committee of the American Municipal Association and the American Association of State Highway Officials, the American Transit Association and numerous other bodies. It has also been endorsed by the Bureau of Public Roads, Department of Commerce, which has participated actively in its preparation.

This program can be of immediate assistance to all administrators and officials having a responsibility in the planning, construction, operation and maintenance of urban transportation systems.

Procedure Manuals Now Available

1A. Determining Street Use
2A. Origin-destination and Land Use
*2B. Conducting a Home Interview Origin-destination Survey
3A. Measuring Traffic Volumes
3B. Determining Travel Time
3C. Conducting a Limited Parking Study
*3D. Conducting a Comprehensive Parking Study

*Manuals prepared by the U.S. Bureau of Public Roads and made available for this series.

3E. Maintaining Accident Records
4A. Measuring Transit Service
5A. Inventory of the Physical Street System
6A. Financial Records and Reports
7A. Recommended Standards for Street Services and Facilities
8A. Recommended Standards for Transit Services and Facilities
11A. Improving Transportation Administration
12A. Modernizing Laws and Ordinances

Procedure Manuals In Preparation

3F. Determining Street Capacity
6B. Cost Accounting
9A. Developing the Transportation Plan
9B. Forecasting Traffic and Land Use
9C. Financing the Transportation Plan
10A. Establishing Project Priorities

Orders for Procedure Manuals should be sent direct to Public Administration Service, 1313 East 60th Street, Chicago 37, Illinois. PAS will maintain a mailing list of all recipients of the Guide, and they will be kept advised when additional publications are available.

Atlanta's Parking Policy

KARL A. BEVINS

Mr. Bevins is the Traffic Engineer of Atlanta, Georgia. Previously, he handled traffic and operating problems in the office of the Transportation Engineer of the Georgia Power Company; later he was Traffic Engineer for the Georgia Power Company, and technical adviser to the Atlanta Chamber of Commerce for the development and execution of the Atlanta Staggered Hours Plan. As a traffic engineering consultant, Mr. Bevins has made numerous recommendations to governing officials in Southern communities. He is a Registered Professional Engineer in Georgia, a member of the Institute of Traffic Engineers, the Highway Research Board, the Georgia Society of Professional Engineers, and Traffic Research Associates.

ATLANTA'S parking policy has been strongly supported by the Mayor, the board of aldermen, the Atlanta traffic and transportation commission, the city traffic engineer, and other officials. Moreover, the policy adopted on September 3, 1957 was strongly recommended by the Atlanta Chamber of Commerce, the Atlanta Clearing House Association, Atlanta Hotel Men's Association, and the Atlanta Junior Chamber of Commerce.

Other supporters on record were the Atlanta Real Estate Board, Atlanta Retail Merchants' Association, Atlanta Traffic and Safety Council, Auto Parking Improvement Association, Building Owners and Managers of Atlanta, Central Atlanta Improvement Association, Women's Chamber of Commerce, Georgia Chapter of the American Institute of Architects, and the Georgia Engineering Society, as well as other organizations and individual citizens.

This parking policy resulted from these considerations:

1. Accessibility to the central business district is vital to the welfare and growth of Atlanta.

2. There is a physical limit to the number of vehicles that can be accommodated on Atlanta streets.

3. During the afternoon rush, the vehicles on streets in the CBD is near to the street capacity.

4. Many authorities on property values and land use say that parking lots in the center of retail districts should be avoided be-

cause they interrupt the contiguous, concentrated nature of the area and the continuity and compactness of retail frontages.

5. Authorities recommend that within the central core of the downtown section, sidewalks – the needs of the pedestrian – be considered of paramount importance.

6. Modern business district design calls for continuity of shops and for the convenience of pedestrians. It recognizes that the over-the-sidewalk movement of automobiles in any area of heavy pedestrian movement is a detriment.

7. The State Highway Department of Georgia and the U. S. Bureau of Public Roads recommended that additional downtown parking spaces should be situated where they intercept traffic approaching the downtown area before it enters the heart of the district.

8. The Metropolitan Planning Commission recommended that the central core be reserved primarily for pedestrians and transit circulation.

The policy emphasizes two basic ideas. The key paragraph reads as follows:

"The commission will study proposals to establish off-street parking facilities within the 'Core Area' and approve proposals only when it is determined that the gain in accessibility outweighs the transit interruption, street overloading, and pedestrian hazards."

Parking is only part of the problem of moving people, and it is not an isolated problem. Every interested individual must recognize the close relationship of parking, traffic movement, and mass transportation.

Closely related to parking are these factors: (a) street capacity to accommodate traffic; (b) the rate of vehicular movement; and (c) the directional pattern – one-way or two-way movement. Planning in Atlanta includes the expressway program and the development of a major street system. And with this planning it is imperative that new parking facilities be integrated.

Parking, closely related also to transit operations, should be tied in with developments that affect transit. *The city must accept continuing responsibility for its parking, traffic and transit problem.* Parking will be with us indefinitely. Occasional studies, the Parking Com-

mission's, for instance, help bring a better understanding of the problem and suggest an approach to its solution. Prospects of changing conditions and the necessity for integrating parking with related problems make it essential that some method be established to fix responsibility for parking. Parking is a *municipal problem.* Officials are charged generally with responsibility for dealing with all municipal problems. It is reasonable that continuing responsibility for Atlanta's parking problems be lodged with city officials.

A Broad Transportation Policy

A special committee of the official traffic and transportation commission has been assigned to develop a transportation policy for Atlanta. That policy will guide the city in future plans for street use, parking facilities, mass transportation, and capital improvements related to traffic and transportation. The recently adopted *parking* policy is expected to fit into this broad *transportation* policy.

Street use involves the use of streets for parking, truck loading, taxicab stands, bus stops, as well as the movement of vehicles and pedestrians. The location and type of parking facilities will be given consideration. Mass transportation and its future role will receive special attention. Special transit ideas such as shelters at bus stops, the relocation of stops, exclusive transit lanes, and other related items will be studied.

One of the most important items will be the matter of public expenditures for capital improvements in the field of transportation. The emphasis on improvement of the local street system versus expressway construction and the future role of various forms of mass transportation are of paramount importance.

The facilities of a number of official and semi-official agencies within the city are used in this project. Among the most prominent contributing agencies are the Metropolitan Planning Commission, the City Planning Commission, the Construction Department, City Traffic Engineering Department, the Transit System, Incorporated and the Traffic and Safety Council. The Chamber of Commerce, the Central Improvement Association and the Retail Merchants' Association also are contributing advice and guidance.

The Mayor and board of aldermen are fully aware that a tremendous capital improvement program is needed if the city is

to realize its growth potential. With the population of the metropolitan area nearing the million mark, a number of reliable agencies predict that Atlanta will reach the two million mark within the next twenty-five to thirty years.

Many important needs other than traffic and transportation compete for funds in every capital improvement program of this type. Sewers, water, schools, parks, sanitary facilities, police and fire protection, to mention a few, must be carefully considered and balanced by the governing body of the city in any capital improvement program adopted.

The Chamber of Commerce has taken the lead among other citizen groups in urging the Mayor and board of aldermen to make a thorough study of and plan to provide these capital improvement needs. Also, possible means of financing such capital improvements are being studied. The Chamber of Commerce, traditionally opposed to additional taxes on real property, is urging the city government to take these steps. Virtually everyone familiar with the progress of these studies recognizes that the city must have other means of raising revenue than those in current use. The bonding capacity of the city and county is being analyzed. Other possible new sources of revenue are being investigated.

In the field of traffic, a number of items are being carefully tabulated and evaluated. Important among these is an inventory of the existing street capacity. In the downtown section, for example, possible means for increasing the existing street capacity by additional parking restrictions, the use of one-way streets, the use of reversible lanes, revisions in the traffic signal system and street improvement projects are being thoroughly investigated.

Estimates of future demands for street capacity are being made, based on anticipated loads from the expressway system, the growth potential of the downtown area and the metropolitan area of the city as well as the traffic load which existing and proposed off-street parking facilities may generate.

The policy will, in all probability, deal with some of the following points:

1. The cost to the city and accompanying limitations if mass transportation is allowed to degenerate and the dependence for transportation is placed entirely upon the automobile.

2. The opposite of this proposition is to prohibit the use of

private automobiles in the downtown section and reserve its streets and selected arterial routes feeding the downtown section for the exclusive use of transit vehicles.

3. A compromise between the two above mentioned extremes. This compromise, which seems the most likely choice, would contemplate the use of both the automobile and mass transportation and would undoubtedly note such facts as:

1. Approximately one out of every three automobiles on the streets of downtown Atlanta is actually a through-vehicle traveling across town that might be diverted from the downtown streets with proper by-pass routes.

2. Approximately two out of every three vehicles parked in off-street parking facilities in the heart of the downtown section are parked there by an all-day parker. If these all-day parkers could be transferred from the central core to fringe areas, peak-hour congestion would be greatly reduced and the valuable close-in parking made more productive for downtown business. The possibility of tying fringe parking areas to urban renewal plans is being carefully considered. Both the planning agencies and the transit system have already made proposals for such operations.

Solving Downtown Parking

Atlanta experienced a rapid postwar growth, evidenced by outward expansion of residential and commercial districts and by greater concentration of capital within the central business district. Office buildings, department stores, and other multi-story structures stand where there were formerly single-story buildings, residences, or vacant lots.

There has been a consequent increase in vehicle registration. In 1945, the two counties in which Atlanta is located had combined vehicle registrations of 110,818. By 1955, this total reached 276,348, an increase of 151 percent. The central business district is invariably an outstanding traffic generator requiring heavy parking. Therefore, a natural result of Atlanta's rapid growth was a large increase in the number of drivers who wished to park in the CBD.

Lack of parking facilities became a matter of serious concern to those interested in seeing the downtown area continue its pros-

perous and proper role. In March, 1953, the state legislature created the Atlanta Parking Commission to study the parking problem and provide data concerning the location and extent of needed off-street facilities. The commission was directed to publish its findings and make specific recommendations.

Parking supply and demand in an area six-tenths of a square mile were analyzed. The area covered the downtown business region in which the parking problem was most critical. Public hearings were held to give to the commission the benefit of diverse opinions of individuals and organizations. After analyzing the results of this study and considering the parking problem in its proper relation to traffic control and mass transit operation, the commission published its findings and recommendations in October 1953.

In stating its conclusions and recommendations to the state legislature, the commission discussed at length the question of private enterprise versus municipal operation of parking facilities. The final conclusion of the commission was:

"We regard private enterprise as a most desirable and efficient medium for conducting the parking business; our finding of facts with respect to present supply and demand and our projections into the future lead us to believe that most of the shortages now and in the future can be taken care of if private enterprise makes a determined effort to do so; but, if private enterprise cannot do the job either because future demand greatly exceeds our estimates or because private operators do not respond fully to their opportunity, then the community may be forced to do what we consider the undesirable method of direct municipal action."

The commission also recommended laws to authorize the city to restrict, limit or otherwise regulate the use of buildings and lots for public parking. The legislature empowered city authorities to regulate parking facilities as recommended, and a new traffic and transportation commission was created to aid. This new body is composed of the mayor and one alderman as ex-officio members, seven citizens and the city traffic engineer as secretary.

One of its prime duties is to investigate each proposal for a new or expanded off-street parking facility, giving proper weight to such factors as street capacity, ingress and egress, reservoir space

and the effect on future traffic improvement plans. The findings of the commission are submitted to the board of aldermen with a recommendation for approval or denial of the permit. Since the adoption of this program, there has been a marked increase in off-street parking spaces in downtown Atlanta.

Prior to 1953, parking operators were reluctant to provide new facilities, sensing that municipal ownership or operation might become a reality in Atlanta. Recommendations of the 1953 parking commission challenged the parking operators by indicating that municipal ownership would be used only if private enterprise failed to meet the parking needs.

Private operators have accepted the challenge and have made commendable progress. In May 1953, when the parking commission's study was conducted, there were 16,460 off-street spaces available. By December 1956, spaces had increased by 5,078 to 21,538 – thirty-one percent. Of the 5,078 spaces added, 4,032 are in modern garage structures. This means that garage spaces, more desirable because of their permanent nature, increased eighty-three percent in three-and-half years – forty-one percent of the spaces available as compared with twenty-nine percent in May 1953. Figures I and II give some measure of the improvement in parking. More than 1,000 spaces were added or put under construction since the beginning of 1957.

Figure I compares the rates of change in off-street parking spaces and the vehicles registered in the two counties in which Atlanta is situated. A semi-logarithmic scale was selected for this graph since equal slopes indicate the same relative, or percentage, change in quantities, whether it happens to occur among low or among high values of the series. This graph indicates that vehicle registrations increased rapidly for several years after 1945 but have leveled off in recent years. Parking spaces, on the other hand, have shown a greater rate of increase during the years following the adoption of a private enterprise system of off-street parking.

Figure II shows by the broken line the number of spaces the parking commission indicated should be progressively added to the 1953 supply in order to meet the increasing demand. The solid line shows the actual number of spaces added through the end of 1956. The chart shows that the 1953 parking commission

estimated a need of an additional 1,401 spaces by 1956; however, by that date, there had been an overall gain of 4,686 (including the loss in curb space) or three times as many new spaces as the need estimated by the 1953 parking commission.

Parking Related to Full Problem

Atlanta believes that the parking problem must be considered in conjunction with two closely related problems, traffic movement and mass transit operation. The city believes also that definite, continuing responsibility for the parking problem must be exercised by the governing body of the city. To accomplish these objectives, the state legislature amended the city charter to provide for a permit system that regulates the use of buildings and lots for off-street parking purposes. Three key bodies are involved in this legislation:

1. A new committee of the board of aldermen co-ordinating the various city activities in the field of traffic and local transportation.

2. A new traffic and transportation commission.

3. New duties and responsibilities for the traffic engineering department.

The charter amendment provided for a new committee of members of the board of aldermen. This committee is called the Committee on Traffic, Parking, and Transit. Its membership is composed of the chairman of the police committee, the chairman of the public works committee, the chairman of the electric lights committee and the chairman of the finance committee. The primary responsibility of this committee is to start and co-ordinate the various city activities in the field of traffic and local transportation. Its membership as set forth in the charter amendment makes it a powerful and effective committee. Its influence, interest, and authority reaches across many administrative departments within the city.

The traffic and transportation commission provided for in the charter amendment has nine members – seven citizen members and two ex-officio. The citizen members are nominated by the Mayor and confirmed by the board of aldermen. Election is for four years. The terms of office are staggered so that the thinking and programs

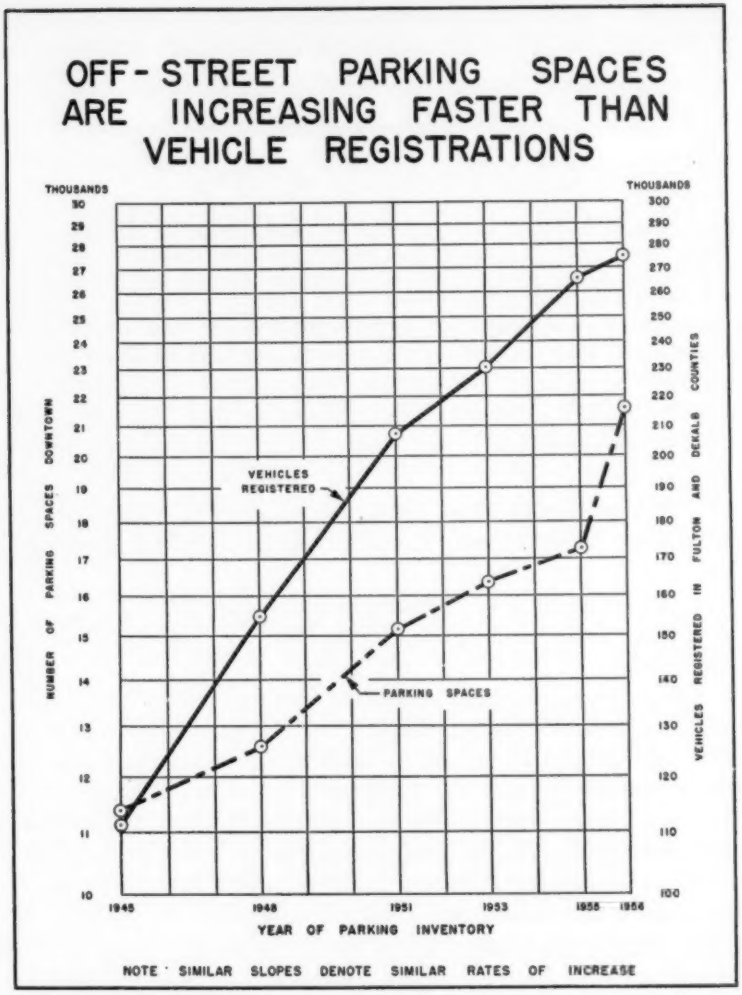
OFF-STREET PARKING SPACES ARE INCREASING FASTER THAN VEHICLE REGISTRATIONS
THOUSANDS
NUMBER OF PARKING SPACES DOWNTOWN
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
THOUSANDS
VEHICLES REGISTERED IN FULTON AND DEKALB COUNTIES
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
VEHICLES REGISTERED
PARKING SPACES
1945
1948
1951
1953
1955
1956
YEAR OF PARKING INVENTORY
NOTE · SIMILAR SLOPES DENOTE SIMILAR RATES OF INCREASE

Figure 1.

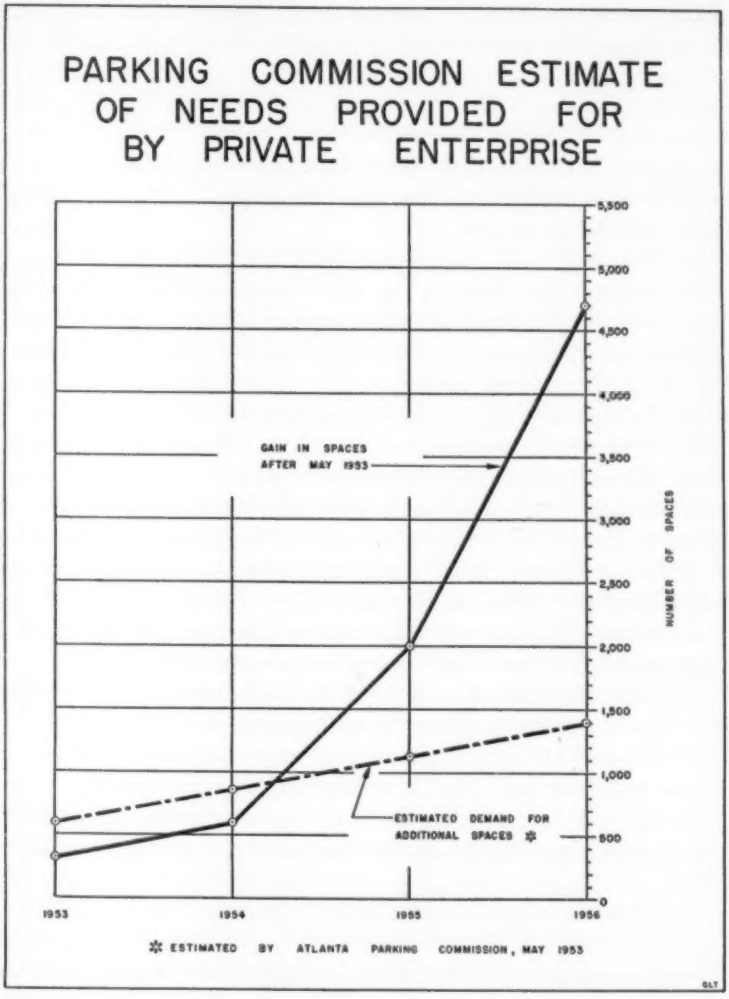
PARKING COMMISSION ESTIMATE OF NEEDS PROVIDED FOR BY PRIVATE ENTERPRISE
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
NUMBER OF SPACES
GAIN IN SPACES AFTER MAY 1953
ESTIMATED DEMAND FOR ADDITIONAL SPACES ✲
1953
1954
1955
1956
✲ ESTIMATED BY ATLANTA PARKING COMMISSION, MAY 1953
GLT

Figure 2.

of the commission can be more or less continuous. The ex-officio members are the Mayor or the president of the board of aldermen as his alternate and another member of the board of aldermen, usually a member of the aldermanic committee on traffic, parking and transit.

In addition to the duties normally assigned to such commissions in the field of traffic, the following dealing specifically with parking have been assigned to it:

1. To review periodically studies made by the department of traffic engineering showing the current status of supply and demand for off-street parking facilities in downtown and other areas of Atlanta and to make recommendations to the board of aldermen regarding the parking problem.

2. To review periodically studies made by the department on curb parking and parking meters and to make recommendations to the board of aldermen on these subjects.

3. To receive applications and reapplications for permits to use property (zoned for business) for new off-street parking facilities or expand existing off-street parking facilities; to hold public hearings and to take evidence regarding such application; to recommend to the board of aldermen that such applications be approved or disapproved, after consideration of such factors as:

(a) Size of proposed facility (especially in relation to the vehicular capacity of streets of ingress and egress).

(b) Physical arrangements for ingress and egress.

(c) Reservoir space for incoming and outgoing vehicles.

(d) Effects of any plan (such as the expressway program or major street plan) on the flow or the pattern of traffic in adjacent streets.

(e) Financial responsibility of the applicant.

The department of traffic engineering was reorganized and additional personnel provided at the assistant traffic engineer level to provide a substantial amount of staff time for dealing with the subjects of parking and transit, in addition to the usual duties of a traffic engineering department. Specific duties assigned to the department's parking division include the following:

1. To take over the files of the Atlanta Parking Commission, especially its records relating to supply of (inventory) and demand for parking spaces in downtown Atlanta.

2. Keep these records up to date and available promptly upon request to:

(a) Any interested citizen (including operators or prospective operators of parking facilities).

(b) The traffic and transportation commission.

(c) Any other governmental agency (including specifically the members of the General Assembly from Fulton and DeKalb Counties).

3. To lend technical assistance to those desiring to engage in the business of off-street parking.

4. To make studies, as necessary, of the parking problem in any section of the city and report its recommendations to the traffic and transportation commission.

5. To examine for the commission all applications for permits to operate new off-street parking facilities or to expand existing facilities and to report its recommendations.

6. To study systematically existing off-street parking facilities for the purpose of recommending any physical changes that would aid the traffic flow on adjacent streets. Such recommendations to be made directly to the operators of such facilities with notification to the police department or other appropriate city departments.

7. To study continuously the problem of curb parking and participate with other divisions of the traffic engineering department in recommendations to the commission regarding such parking.

It is believed that this charter amendment has set forth the framework for a continuing and intelligent approach – a master plan – towards the solution to Atlanta's parking. Provisions are made for a closely co-ordinated attack on the parking problem and the inter-related problems of traffic and transit.

Definite and continuing responsibility for these problems is fixed with the government of the city. The benefits of a continuing market survey and technical advice from a city agency are made available to parking operators.

In carrying out the directives of this charter amendment, the traffic and transportation commission conceives it to be its duty to offer encouragement where it tends to facilitate and encourage the growing business community. As business has moved outward from the central core area, it has carried with it problems of congestion and parking, but naturally, the core area still presents the greater

problem. The commission is, in their thinking, taking the area presenting the greatest problem – the center – and working outward.

One of the first problems is accessibility. Although the city, county, state and federal governments are co-operating to provide new streets and roads to accommodate the growing traffic, it is vitally necessary and will always be necessary to make the best use of the existing streets. Although this is the age of the automobile, it is a fact that insofar as movement within cities is concerned, the bigger the city, the smaller the percentage of those leaving and entering the business district by private automobiles.

A good means of public transit is necessary to the preservation of a healthy central business district and must bear an increasing part in bringing people to the central district. The commission recognizes that as the number of cars in use increases, the number entering the business district will tend to increase.

These must be accommodated and not discouraged. The various governments are spending large sums providing expressways designed specifically for automobile movement. Studies show that in Atlanta something better than fifty percent of those who work in the core area use public transportation.

In studying the means of maintaining the accessibility of the core area, all findings have been predicated on transit continuing to maintain its present percentage. Citizens who use transit are taxpayers and every effort should be made to see that they are rendered service. Until ways are found to provide special facilities for rapid transit, and since transit vehicles are confined to specific streets and cannot seek other streets with less congestion as can private automobiles, the commission plans as a matter of policy to exert every effort to:

1. Facilitate movement of all traffic on transit thoroughfares.
2. Free transit vehicles from delaying congestion.

As the business district has expanded, the distance between business locations has increased to the point where circulation within the business district cannot be accomplished on foot. As people move during business hours within this business district, there is created an additional traffic and parking problem.

The policy of the commission is to do what it can to encourage the development of better transit service during business hours

within the business district, so as to provide mass means of circulation and reduce the complication of parking during shopping hours. Experience indicates that meters are the best method of controlling on-street parking. The question of on-street parking is being related to the movement of traffic and not to the availability of off-street parking because the primary purpose of streets is to move traffic.

Off-street parking is being encouraged, but it is obvious that the tremendous unsatisfied demand and the constant increase in the number of automobiles make it impossible to balance supply and demand in any limited area. During recent years, Atlanta, employing the co-operative approach among property owners, parking operators and the city government, has made tremendous progress in increasing the supply of off-street parking spaces, both all day and short time, in the downtown area. The commission believes that this co-operative approach should be continued.

Office space within the core area is preferred because of its being within easy walking distance of other offices and stores. Shops prefer it because they are within minutes of each other by foot or shoppers' bus. Acknowledged authorities on downtown property values and land use are on record as saying that parking lots in the center of central retail districts should be avoided because they interrupt the contiguous and concentrated nature of the area and the continuity and compactness of retail frontages which are essential elements.

All of this suggests that in this area sidewalks and the need of pedestrians assume paramount importance. All modern design of business districts call for continuity of shops and convenience of pedestrians. Over-the-sidewalk movement of automobiles in any area where there is heavy pedestrian movement is a detriment to that area.

As a matter of policy, the commission is discouraging any location of parking facilities which interfere with heavy pedestrian movement. Also, as a matter of policy, the commission is insisting that garages be so operated that there is no unwarranted delay in accepting automobiles off the street and that automobiles not be permitted to stop partly over the sidewalk to interfere with pedestrians.

The State Highway Department of Georgia and the Public Roads Administration advised Atlanta some years ago that additional parking spaces should be located to intercept traffic approaching the downtown area before it entered the heart of the district. They made it plain that this was especially true of all-day parkers who enter and leave the area during the morning and afternoon rush hours. This has been the judgment of many groups since. It is obvious that there is a limit to the number of vehicles that can be accommodated in the area of highest density in the business district.

Physical and economic factors definitely limit the extent to which private automobile transportation can expand within the central business district. For example, street capacities are definitely limited. Without mass transportation, the ratio of land area required for off-street parking to floor-area devoted to business-use ranges from two to one for a general mixture of office buildings and retail shops to six to one for a district which is entirely made up of retail establishments.

The attainment of such ratios in downtown sections is virtually impossible. The cost of acquiring land for off-street parking facilities definitely limits the amount which can be devoted to such use. Great difficulty is usually experienced in assembling tracts of land of suitable size for off-street parking.

The Atlanta traffic and transportation commission's recommended policy on parking which has been adopted by the city appears therefore to be sound and in keeping with present-day thinking. Their proposal to "carefully study all proposals to establish off-street parking facilities within the core area and approve such proposals only when it is determined that the overall gain in accessibility outweighs the transit interruption, street overloading and pedestrian hazards" appears to be achieving good results. The traffic engineering department of the city has the primary responsibility for developing the factual information necessary for the consideration of each of these off-street parking proposals.

The Mayor and board of aldermen (the elected officials) of the city provide the traffic engineering department which serves as the principal source of technical information and service in the traffic field. Top management from the various business establishments in the city contributes time and judgment to the job of analyzing

and using the factual information provided by the traffic engineering department.

A large number of these businessmen serve on volunteer committees within various associations and organizations and combine talents with the traffic engineering department to provide advice and recommendations for the consideration of the Mayor and the board of aldermen. It is significant that the leading businessmen of the city spend a substantial amount of time in attending committee meetings and public hearings in order to become informed on traffic matters. They then contribute their skilled and proved business judgment and advice in the formulation of policies.

The Atlanta Traffic and Safety Council, the Atlanta Chamber of Commerce and the Central Atlanta Improvement Association all have active committees engaged in the various phases of traffic improvement. Care is taken that the committees set up within these organizations do not allow their activities to overlap to any extent. The Atlanta Traffic and Safety Council takes the lead in these matters.

Government, Business Pool Talents

This three-pronged attack of top business management, professional traffic engineering service and the duly elected representatives of the people on the aldermanic board provides an effective means of dealing with the traffic problem. The elected officials who are members of the board of aldermen are close to the voters and subject to immediate pressure from the organized minorities which normally oppose proposals for traffic improvement. The official traffic and transportation commission tends to off-set some of the effect of these organized minorities. It provides through its public hearings a forum which enables the members of the board of aldermen to evaluate the merits of a traffic improvement proposal before it actually reaches them for a decision.

In the event that the board of aldermen is not satisfied with the information furnished them or with the recommendation, they may refer the matter to the traffic and transportation commission for further public hearings. At this point, the traffic and transportation commission may turn to the Atlanta Traffic and Safety Council and request that it assign some of its working committees the task of reviewing the entire proposal.

This procedure immediately brings into play a large cross section of sometimes conflicting business interests within the city. Since these business interests are represented on the various committees of the Atlanta Traffic and Safety Council by their top management, consideration of a proposal by this organization never fails to bring valuable and sound recommendations. Recommendations coming from the Atlanta Traffic and Safety Council usually have the backing of an overwhelming majority of the members of the various committees within the organization as well as the officers and board of directors of the organization.

Since these men represent the top management of the principal business within the city, the members of the board of aldermen can accept such recommendations with confidence that the majority of the leading businessmen in the city consider the proposal good for their businesses and for the community.

Such a recommendation from the Atlanta Traffic and Safety Council supported by the city traffic engineer, members of the traffic and transportation commission and others interested in traffic improvement, successfully offsets the bad effects of well organized minority groups which traditionally oppose traffic improvement measures. This democratic process is getting results in Atlanta and we believe that it is worthy of the consideration of all who are interested in traffic improvement and the democratic system of government.

Expressways and Apartment Sites

HOMER HOYT

Mr. Hoyt has been president of Homer Hoyt Associates, consulting land economists, since 1946. Previously he was Director of Economic Studies for the Regional Plan Association of New York; Director of Research for the Chicago Plan Commission, and principal Housing Economist for the Federal Housing Association. He was an Associate Professor of Economics at the University of Missouri and at the University of North Carolina. Recently he has made economic surveys for the Redevelopment Agency of the City of Los Angeles, for the San Diego Downtown Association, and for Providence, R. I., City Plan Commission. Widely experienced in shopping center market surveys, Mr. Hoyt is currently making these surveys for Ottawa and Montreal, Canada, Baltimore, Lynchburg, and other cities. He is a member of the bar, the American Economic Association, the American Statistical Association, the American Society of Planning Officials, and other professional organizations in his field. He is the author of several books and articles on land values.

EXPRESSWAYS and controlled access highways entering metropolitan districts expanded single-family home areas on the suburban fringe. In the early days of suburban railroads, elevated, and subway lines, prongs of residential settlement projected into areas that could be reached in an hour's travel from central places of employment.

Similarly, the Calumet Expressway in the Chicago region, the Santa Ana Freeway in Los Angeles, the belt highway around Boston, the Gulf Freeway in Houston and many others, have caused hundreds of houses to spring up along their routes. Workers can travel quickly along these fast routes to their offices or factories – many of which are also conveniently situated along the expressways.

Single-family ranch-style houses have absorbed vast areas of land in the home-building boom of the last decade, so the home buyer must travel farther and farther out to find a site for a new house. Increased reliance upon private automobiles for transportation as residential areas have been developed beyond fixed mass transit routes, combined with the tremendous suburban growth,

has created intense congestion, even on eight-lane freeways. In morning and evening rush hours, travel time between work and home in new peripheral suburban areas has lengthened until it is now often more than two hours a day.

Exhaustion of close-in land cheap enough for single-family houses, and the slower travel time on congested expressways, have produced a strong recent trend toward apartment living. In the Los Angeles area the number of apartment units built in 1957 increased forty-one percent over 1956, while the number of single-family home units declined thirty percent in the same period.

In the New York metropolitan area, in the first half of 1957, multi-family units constituted 30.4 percent of all units.[1] In Bergen, Union, and Nassau Counties, New Jersey, multi-family units comprised seventeen, twenty and nineteen percent respectively of the number of units in the first six months of 1957, compared with seven, six and three percent respectively in the period 1951–1955 inclusive. This shows the marked increase in suburban apartments in the last year in the New York area.

The trend toward more apartment building is nationwide. Private apartment building in the United States rose forty percent in 1957 as compared with 1956, while single-family home construction declined in this period, according to the Bureau of Labor Statistics.

As metropolitan areas reach a population of five to ten million, either apartment or row-house dwellings for part of the population become almost inevitable. This is particularly true when families prefer the one-floor ranch house, spread out on a lot eighty by one hundred and twenty-five feet or more. Not more than three such houses can be built on an acre, after allowing for streets.

Schools, churches, and shopping centers also require much more ground than formerly for parking and recreation areas. In many locations, part of the land cannot be used because of steep terrain, low ground subject to floods, or soil conditions that prevent the use of septic tanks. A conservative estimate would be that not over half of the land in residential communities could be used for homesites.

1. Regional Plan Association of New York. R.P.A. Bulletin 88, New Homes. First six months, 1957.

A population of five million – approximately one and a half million households – living in ranch houses would need 500,000 acres for homesites alone, or one million acres to accommodate churches, schools, shopping centers and recreation areas that serve them. This acreage is equivalent to 1560 square miles, without taking into account industrial districts, central city areas, or public buildings other than schools.

Since most large metropolitan areas – New York, Chicago, Detroit, Philadelphia – border on oceans, lakes or bays, and even mountains as do Los Angeles and Denver, the securing of 1560 square miles of residential land would involve pushing out the fringe of residential settlement as much as thirty to fifty miles from the center of the metropolis. This suburban population would be spread out in the low density of single-family homes, making mass transportation lines uneconomic. To be profitable, mass transit requires a high density of population along its routes.

Close-in Apartments Save Travel-Time

Confronted with the problem of travel to these distant homesites, the family without children or with children of pre-school age, or the family whose children have grown up and left home, finds it convenient to save travel-time between home and work by living in an apartment. The walkup apartment can house thirty to fifty families to the acre; the tower elevator apartment can accommodate one hundred and fifty to two hundred and fifty families to the acre – compared with three or four families in single-family houses – and still allow for ample light and air in every apartment.

With this more intensive use of the land, the apartment builder can afford to pay from $2 to $5 a square foot for the site. These prices, amounting to only $1,500 to $2,000 per apartment unit, would amount to $15,000 or more for a single-family homesite – a prohibitive figure for all except wealthy families. Apartment builders can afford to buy close-in sites and pay for old homes that will be razed, because of the large number of apartment units that may be placed on the site occupied by a single house.

Prior to 1930, most apartment units were built along subway lines in New York City, along elevated lines in Chicago, or in

central areas of other cities. Colonial Village in Arlington County, Virginia, near Washington, D.C. was one of the first apartment clusters to be built away from mass transit routes.

The success of this project and Federal Housing Authority 206 financing stimulated a rapid growth of apartments in Arlington County and other suburban areas in the United States in the years before World War II. After World War II, in many sections of the country there was a boom period of suburban apartment building financed by the liberal Federal Housing Authority 608 terms. In New York City, the trend was away from subways, with extensive apartment building in the West Bronx near automobile parkways.

One advantage of the apartment cluster on large ground areas was the ability to provide tenants with garage space for their automobiles, a necessity as the ownership of private automobiles became universal. The older apartments near subways or in central areas not only lacked garages but they were usually situated in districts of great street traffic congestion. The newer apartments on parkways afforded the car owner more convenient travel out of the city or to places of employment situated along parkways.

New Apartments Near Business Centers

In selecting locations for apartments along expressways, the choice is not confined to vacant tracts because the builder of an elevator apartment can afford to pay a price for the land high enough to absorb the value of single-family homes to be razed. On the other hand, it can hardly ever be profitable to demolish even an obsolete one-family structure to erect a new modern one-family unit in its place. Consequently the redevelopment of central areas for residential use is by economic necessity limited to multi-dwelling unit structures.

Since apartment buildings constitute an intensive use of land, investors in new apartment buildings can afford to pay a premium for sites that reduce to the minimum the travel-time between home and office. Executives, whose time is valuable, are willing to pay premium rents for apartments such as those on Park Avenue in New York City or on the Near North Side of Chicago, only a short distance from central offices, stores and theatres.

Apartment locations on expressways enjoy the advantages not only of access to parkways for long distance trips, but also of convenient offices, factories and shopping centers either on parkways or in central areas at the convergence of parkways. In Los Angeles, the major freeways – the Hollywood, Pasadena, Santa Ana and Harbor Freeways – converge near the central business district. An area of one hundred and thirty-five acres on a 100-foot elevation above the Los Angeles plain known as Bunker Hill, will be cleared of its obsolete structures; office buildings, hotels, garages and tower apartments will be built on the site. Here the tenants will not only be at the intersection of the freeways so they can drive quickly into or out of Los Angeles in any direction, but they will have ample parking facilities in their apartment buildings; and they will be within walking distance of their offices and downtown stores.

In looking for future apartment locations on expressways, an effort should be made to select sites either near or on expressways leading to new regional shopping centers or to office buildings or factories, which can also be located to great advantage on parkways. The apartment-dweller prefers to live near restaurants, food stores, drug stores, beauty shops and gift shops, and large apartment projects provide sufficient tenants to support a neighborhood drug store or food store.

A regional shopping center on a major highway creates a natural site for apartments if there is vacant land adjoining the center. In the Boston area, industries and the new North Shore Shopping Center at Peabody, on the belt highway encircling Boston, create a market for apartments on this highway.

The Prudential Insurance Company has selected sites with ample ground outside the central business district for its regional offices in Houston and Minneapolis, as has the Connecticut General in Hartford. Companies whose operations are entirely self-sufficient within themselves, but whose workers or clients come either from homes in the metropolitan area or from other states, would find it to their advantage to select sites along parkways.

The new express highway program, particularly in providing for belt highways around cities or through cities, will create apartment sites of exceptional value. The proposed belt highway around Washington, D.C., the West Side Highway in Chicago, the Gulf

Freeway in Houston, the expressway through Atlanta, and scores of others, will open up such tracts.

There, families can live in elevator apartments accessible to suburban offices or factories, and even to central offices. That would avoid the cost, time, and exertion of long trips to work during congested hours. Traffic jams will to some extent be alleviated by the trend toward apartment living close to employment, because it will remove from highways the cars of workers who formerly drove to distant family-home communities.

Off-Street Parking in California Financed by Revenue Bonds

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MOST California cities with curb parking meters have used some of the revenues from those meters to provide off-street parking facilities. Several cities have been able to develop large off-street lots by using current parking meter revenues. In general, except in the smallest cities, the pay-as-you-go method has not permitted cities to proceed as rapidly as they would desire. This fact has caused increasingly extensive use by California cities of credit financing for municipal off-street parking and the issuance of bonds of various kinds.

Under the constitution and general laws of the State of California, cities have been able to use a variety of methods for financing publicly owned off-street parking. These have involved general obligation bonds, revenue bonds, special assessment proceedings, and some special methods combining features of the others.

This article deals primarily with revenue bonds, which have financed most of the large municipal off-street parking projects undertaken in recent years in California. Revenue bonds are secured only by parking revenue. Cities cannot be compelled to use general funds or to levy taxes to pay revenue bond interest and principal. General obligation bonds involve a pledge of the full faith and credit of the city, including the power of taxation; assessment bonds are secured by liens on specific parcels of property.

Differences among these bonds are illustrated generally in the following tabulation:

	Revenue Bonds	*General Obligation Bonds*	*Special Assessment Bonds*
Security	Parking revenues only	Full faith and credit including unlimited taxation	Assessment liens on real property
Source of Payment	On-street and off-street parking revenues	Parking revenues or other city funds	Installment payments by property owners; possibly some parking revenue.
Authorization	Majority vote	Two-thirds vote	Petition of owners

The experience of California cities with parking revenue bonds, the principal characteristics of these bond issues, and some of the reasons for using this method are presented here.

Some revenue bond features have been embodied in the Parking District Law of 1951 and other procedures used by some California cities. In the 1951 act and in similar charter proceedings, the power of limited taxation within a specified district is provided in addition to parking revenues. Because of this tax support, these parking district bonds are not strictly revenue bonds.

Revenue bonds are characterized by dependence entirely on parking revenues without any other security being offered to bondholders. These revenues include both off-street and on-street income. No California revenue bonds have been sold without a pledge of on-street meter revenues. The pledge of revenues from an enterprise including curb parking meters and off-street facilities is a particularly significant feature of these bonds.

In connection with the sale of bonds, cities have had to make various commitments to bondholders and to agree to certain covenants.

Reasons for Using Revenue Bonds

Several reasons account for the choice of revenue bonds over other available financing methods. The idea that parking meter revenue should be used to provide off-street parking is generally well accepted; there is reluctance to use other city funds for parking or for the payment of parking bonds.

Revenue bonds offer a means for undertaking a city-wide off-street parking program. If all parking meters and all off-street facilities are considered part of a system, new facilities can be pro-

vided on the basis of need, with better revenue-producing projects helping to support weaker units of the city-wide program.

Most of the other widely used financing methods in California, except pay-as-you-go, involve participation by property owners through direct contributions, assessment liens, or contingent tax liability. Revenue bond financing appeals to those who would otherwise be obliged to participate more directly in paying for off-street parking. Revenue bond financing appears simpler to organize and to carry through to completion than any of the parking districts authorized under state law. Majority vote of the electorate is usually as easy to obtain as a majority petition in a sizeable parking district.

City general obligation bonds have most of the advantages of revenue bonds, sell at lower interest rates, and impose fewer restrictions on the issuer. For three reasons, revenue bonds have proved politically far more acceptable:

1. General obligation bonds do not guarantee that only parking revenues will be used to pay interest and principal.

2. General obligations, while they may be paid from revenues, impose a potential tax lien on real property and permit use of the city's general fund.

3. Revenue bonds can be authorized by simple majority vote while general obligations require a two-thirds majority.

California cities all operate under general obligation debt limitation, but statutory limitations have not been a factor in the choice of the revenue bond method. Cities that have sold parking revenue bonds all have had ample capacity for a similar amount of general obligation bonds. Debt limits may possibly affect cities' decisions on financing parking in the future but this factor has not been significant to date.

Legislative Authority for Revenue Bonds

California's first general state legislation authorizing issuance of parking revenue bonds was enacted in 1949. In 1950 the state constitution was amended to permit cities to pledge revenues from on-street parking meters to the payment of interest on and principal of parking revenue bonds.

Bonds secured only by off-street revenues would have been impossible or at least very difficult to sell. Leading attorneys questioned the power of cities to pledge on-street meter revenues or to agree to maintain meters on the streets in the absence of specific constitutional authority. Under the 1950 amendment, however, agreement by a city issuing revenue bonds to maintain meters and to pledge their revenues to the security of the bonds is not an unlawful delegation of police power.

No revenue bonds have been issued under either of the two revenue bond laws enacted by the 1949 legislature. One of these, the Parking Law of 1949, provides for creation of parking authorities, and California's only parking authorities, San Francisco and Santa Monica, operate under this 1949 law.

The principal impetus for revenue bond financing developed in cities which amended their charters to permit the issuance of parking revenue bonds secured by on-street meter revenue as well as off-street parking revenue. The first such amendment was adopted by Sacramento in 1948. After approval of the constitutional amendment in 1950, Sacramento sold $1,600,000 in revenue bonds in 1951, the first such issue in California.

Similar charter amendments were adopted in the next several years by Fresno, Richmond, Vallejo, and a number of other cities. Until 1953 the only methods available for issuing revenue bonds were found in the 1949 laws and in the charter amendments. The charter method appeared to impose fewer restrictions and to provide much greater flexibility in issuing bonds and in operating parking facilities.

In 1953 the state legislature amended the Sanitation, Sewer, and Water Revenue Bond Law of 1941 to include off-street parking as a permissible purpose for which revenue bonds could be sold. This amendment, which changed the name of the act to the Revenue Bond Law of 1941, extended authority to issue parking revenue bonds to all cities.

Beverly Hills was the first non-charter city to use this financing method, and other general law cities can be expected to sell parking revenue bonds in the future. The number of charter cities that have adopted revenue bond amendments since 1953 – when they were given authority to proceed under general law – suggests that many

charter cities may continue to prefer to issue bonds under charter amendments rather than under the general law.

California Parking Revenue Bond Sales

In six and one-half years since the first bonds were sold, twelve California cities have sold more than $12,000,000 in off-street parking revenue bonds. Sacramento, Berkeley, and Napa have each sold two series of bonds. A complete list of off-street parking revenue bond sales in California is presented below:

Date of Sale	*City*	*Principal Amount*
7/24/51	Sacramento "A"	$ 1,600,000
5/28/53	Fresno	450,000
4/ 8/54	Vallejo	300,000
10/11/54	Richmond	540,000
12/ 7/54	San Jose	2,450,000
1/18/55	Alhambra	200,000
9/13/55	Berkeley "A"	650,000
12/ 6/55	Bakersfield	880,000
5/15/56	Alameda	380,000
7/26/56	Sacramento "B"	1,400,000
8/14/56	Hayward	650,000
8/28/56	Napa "A"	322,000
2/19/57	Berkeley "B"	800,000
8/ 5/57	Napa "B"	143,000
10/29/57	Beverly Hills	1,500,000
		$12,265,000

Sacramento – which sold the first parking revenue bonds in California – also has sold the most: $3,000,000.[1] Series B Bonds were sold to the city employees' retirement fund at public sale. The favorable interest bid of the retirement fund made it possible to sell a larger amount of bonds than other bids would have permitted.

The second series of bonds for both Sacramento and Berkeley financed parking structures, but all other revenue bonds were used to acquire land for off-street parking lots.

Accumulated parking meter income or other city funds were used along with bond proceeds in developing most of these projects and city-owned land was used in some.

1. This city's off-street parking project was described in detail by D. J. Faustman in *Traffic Quarterly*, October 1954, The Eno Foundation, Saugatuck, Conn.

These cities range in population from 19,000 (Napa) to 163,000 (Sacramento). San Jose, Fresno, and Berkeley are other cities over 100,000 included in the list above. None of the five California cities larger than Sacramento have sold revenue bonds, although Oakland (population 400,000) has charter authority to issue revenue bonds and several projects have been proposed to the city council.

Characteristics of Revenue Bond Cities

Revenue bonds have been relatively more popular in northern and central California than in the southern part of the state, where only Alhambra and Beverly Hills are included in the list. The most concentrated area for use of parking revenue bonds is in the East Bay cities. Oakland, Berkeley, Richmond, Alameda, San Leandro, and Hayward, the six largest cities in this area, all have charter authority to issue parking revenue bonds, and all except Oakland and San Leandro have sold bonds.

Commercial off-street parking facilities are quite numerous in Sacramento, Beverly Hills, Fresno, Berkeley, and San Jose. The other cities have relatively fewer commercial parking lots and garages. Alhambra had one of the most extensive systems of metered city-owned lots in California at the time bonds were sold for additional facilities.

Berkeley, Napa, and Beverly Hills also had municipal off-street parking at the time revenue bonds were sold. Berkeley's pre-revenue-bond facility was the co-operative parking lot financed in part by property owner and merchant contributions.[2] Contributors were reimbursed out of the first revenue bond proceeds, thus ending the co-operative feature.

Parking facilities built with revenue bonds have generally been operated directly by cities and in most instances consisted of metered lots. The 1949 state legislation on parking revenue bonds required that all facilities be leased if possible, but the laws and charter amendments under which these bonds were sold have no such requirement. Part of the Beverly Hills project is leased to private operators for attendant parking. Other facilities are metered or are operated by municipal personnel.

2. "The Berkeley Plan: A Co-operative Parking Lot Project," James W. Meyer and Richard Gallagher. *Traffic Quarterly*, October 1952, The Eno Foundation.

The Beverly Hills bonds were sold under provisions of general law. The fourteen other sales were all under city charter provisions of the eleven cities. The chief advantage of the charter amendment method is that it is not necessary to specify any principal amount of bonds in the proposal to be submitted to the electorate. The proposition can be presented as an enabling act only, without emphasizing the fact that bonds will be issued.

Authority for Issuance

The 1941 Act requires that a specific principal amount of bonds be named in the bond proposition. Market conditions impose the same limitations on the amount of bonds that can be sold under either procedure, but there is no other limitation on amount under the charter amendments adopted.

Charter amendments and authorizations under the 1941 law both require a simple majority vote as compared with the two-thirds vote required for authorization of city general obligation bonds.

Some criticism of revenue bond charter amendments has been directed at their length. Bond counsel have found it necessary to include much detail in order to provide the city with the required authority. Some amendments have run more than 4,000 words.

All amendments under which bonds have been sold have dealt solely with off-street parking. Several cities have given consideration to general revenue bond amendments, which would grant authority to issue bonds for water, sewer, and other purposes as well as parking, but no amendments of this type have yet been adopted.

The Bond Resolution

The contract between the city and the bondholders is the resolution of issue. In this lengthy resolution are set forth the terms and conditions of the bonds, provisions for their payment, and covenants setting forth the city's obligations to the bondholders. This resolution corresponds to what is sometimes referred to as a trust indenture.

The recently adopted Stockton charter amendment provides for bonds to be issued by ordinance. One of the principal arguments

advanced against the charter amendment method of authorizing revenue bonds is that the city council is given a "blank check" with no limit on the amount of bonds or projects to be undertaken. An ordinance, subject to referendum, gives the voters an opportunity to reject any specific exercise of power under the amendment. Issuance of revenue bonds by ordinance will probably become much more widely used in the future.

Some resolutions have specified the individual facilities to be built or acquired and have required the city to complete these specific projects. More recently, these requirements have been relaxed and cities have been required only to spend the bond proceeds on revenue-producing projects. How strictly the project should be defined will be dependent largely on the extent to which the bond buyer must rely on off-street revenue. If he is dependent on revenues in certain specific amounts from specific projects, the city should be required to complete those projects.

In almost every case all net revenues of on-street meters and either gross or net revenues from off-street facilities are pledged to the security of the bonds. Sacramento and Fresno both placed dollar limits on the pledge of on-street revenues, but other cities have pledged the entire net.

Definitions of "net revenues" vary among issues, depending on the definition of operation and maintenance expenses. In most cases, operation and maintenance expenses for on-street meters consist of the cost of collection and the cost of actual meter maintenance. Expenses of enforcement are not considered operation and maintenance nor is depreciation of meters charged in determining the net revenues.

The Alameda charter amendment, adopted in 1955, defines net revenues from on-street parking meters as being equal to seventy-five percent of gross revenues, and the 1957 Stockton amendment, latest to be adopted, defines the net as equal to eighty-five percent of the gross. This method simplifies accounting procedures and makes it easier for the city and bondholders to determine the amount of net revenues pledged to the bonds.

The maximum permissible term of parking revenue bonds is forty years under the general law and under all charter amendments. The Berkeley and second Sacramento issues have forty-year maximum terms (bonds issued in 1955 all to mature in 1995, for

instance) with provision for prior retirement from accumulated revenues. Most of the other issues provide for retirement in twenty-five or thirty years.

Maturity and Call Provisions

Maturity schedules have included both serial bonds, in which stated principal amounts of bonds mature and become payable each year, and term or sinking fund bonds, of which certain minimum amounts must be retired each year from money accumulated in a sinking fund. While it is difficult to generalize as to which type of bond would be best suited in a given situation, there has been an increasing tendency to use term bonds except for those with shortest terms, maturing, for instance, in the first ten years.

All or part of the bonds in each issue have been made callable; that is, subject to redemption by the city prior to the stated maturity date on the bond. A premium is provided for bonds called prior to maturity, in order to protect bond yield to investors. A price of 105 might be paid, for instance, for a 1980 bond called in 1960.

Making bonds callable has been advantageous to cities since it has permitted them to use surplus revenues to reduce debt and has made it possible to issue refunding bonds in case of a marked improvement in the municipal bond market. Most of these cities have provided for mandatory use of surplus revenues to call bonds. No parking revenue bonds have yet been refunded although the city of Sacramento seriously considered refunding its Series A bonds at the time the second series was sold. If bond interest rates decline markedly in the future, refunding can be expected for some of these revenue bonds. It is also possible that some cities may choose to refund revenue bonds with lower interest general obligation bonds.

The time from issuance to the first possible call date varies but is usually about five years. Making bonds callable as soon as possible permits the city to begin accelerated debt retirement promptly. This and the related advantages of an early call date must be weighed, however, against the fact that higher interest rates probably will be necessary if bonds are callable in a very short time.

Premiums for call vary, depending on the total term of the issue and conditions in the bond market at time of sale. Maximum premiums are generally five or six percent, and in most cases a

lower premium applies for call from revenues than for call from other sources, such as for refunding.

Coverage

Revenue bond "coverage" is the ratio of annual pledged net revenues to the annual total of interest and principal payable. This is the most common measure of revenue bond security, and cities invariably have agreed in issuing bonds to maintain rates and charges sufficiently high to produce a specified coverage ratio.

The coverage ratio generally provided for with California parking revenue bonds is 1.50. In some instances the minimum coverage has been set at a higher figure. Bakersfield, for instance, established a 1.75 ratio to offset any possible adverse effect on bond buyers which might have remained from the damaging Tehachapi and Arvin earthquakes of two years earlier.

In actual practice, coverage of net revenues over bond interest and principal has been considerably higher than 1.50. In the case of Beverly Hills, existing facilities alone provided coverage of over 2.5 for the $1,500,000 bonds sold in October 1957.

In the event that revenues fail to produce the guaranteed minimum coverage, the issuing cities are required under all of the bond resolutions to increase rates and charges. The bondholder has no recourse to parking facilities or any other city property, but he can compel an increase in parking fees if revenues fail to provide annual net revenues equal to 1.5 times bond service or other guaranteed minimum ratio. No mandatory increases in rates have been necessary in connection with any of these revenue bonds.

Flow of Funds

Sharp declines in revenues might be expected in times of serious economic depression. Some authorities believe that raising parking rates under those conditions would be undesirable and probably would not increase total parking revenues. For these reasons bond buyers tend to rely on demonstrated revenue-producing ability and the general economic soundness of the community rather than the legal ability to compel an increase in parking rates.

Various means have been provided for handling receipts in order to provide security for the bonds. In most cases the city has

been required to appoint a bank or trust company as fiscal agent and to deposit all pledged parking meter revenues with the fiscal agent at least monthly. The fiscal agent then makes monthly transfers to funds set up to pay interest, principal, operation and maintenance, and other charges; he also makes deposits in any sinking funds established for the purpose of calling bonds ahead of their fixed maturity dates. Only after these various requirements have been met may surplus parking revenues be transferred to the city. The effect of these provisions is to guarantee to the bondholder that money for the payment of interest and principal will be accumulated regularly and will be available before money is permitted to be used for other purposes.

Some resolutions have made operation and maintenance expenses of off-street parking facilities a prior charge ahead of interest and principal while others have given priority to bond service. An effect of these provisions is to restrict the availability of parking revenues to the city for general use.

Most bond resolutions provide for a deposit of a portion of surplus revenues in a sinking fund to be used to call bonds prior to maturity. Sinking fund provisions generally provide that after requirements for interest, principal, reserve, and maintenance and operation have been satisfied, a specific percentage of remaining revenues is to be deposited in the sinking fund. Percentages range from twenty percent to more than fifty percent of surplus. The effect of these provisions is to shorten the time bonds are outstanding. Through use of a sinking fund a twenty-five-year bond issue might reasonably be retired in seventeen or eighteen years.

Reserve Fund

Increasing acceptability of parking revenue bonds in the market and questions as to the legality and propriety of the fiscal agent relationship have led to the elimination of fiscal agency provisions in some of the parking revenue bond resolutions and to relaxation of requirements in others. Where there is no fiscal agent provided, requirements similar to those outlined above are imposed on the city treasurer or some other city officials.

As a means of providing some additional security, reserve funds have been created in connection with these bond issues. Money in

the reserve funds is used only to pay interest or principal on bonds when revenues are insufficient to do so. Chief purpose of a reserve is to protect bondholders in case of a temporary shortage of revenues. If revenues continued to fall below the required level, the city would be required to raise parking rates.

The reserve fund is usually created out of the bond sale proceeds and thus tends to increase the size of the bond issue. The reserve is generally equal to a year's total of interest plus principal, representing about six or seven percent of the total bond issue. Sometimes a specific dollar amount is provided, but most recent issues have provided that the reserve fund balance must be equal to the highest total of interest plus principal payable in any future year.

Additional Bonds

The resolutions under which these revenue bonds have been sold have permitted issuance of additional bonds under certain circumstances. This has been one of the most important provisions included in these resolutions since it permits continued expansion of off-street parking facilities. Usually, to sell additional bonds, the city must demonstrate that it has had or will have annual net revenues in excess of 1.50 times the future total of annual interest plus principal on both the outstanding and the additional bonds. An allowance is made for new revenues to be developed by new facilities. Sometimes an even higher ratio is established for the additional bonds than for the minimum coverage. This provision for additional bonds is an important advantage of revenue bonds, and three cities have sold second series. Sufficiency of revenues determines whether or not additional projects can be financed under the revenue bond method.

Other Covenants

Revenue bonds impose some other restrictions on cities beyond those involving handling of funds. Competition by the city with its revenue bond project is usually forbidden unless the revenues from the "competing" facilities are also pledged to the bonds. Free parking is prohibited, and some restrictions are imposed on the

reduction of parking rates. The city of Inglewood authorized revenue bonds under the 1941 law but decided not to issue any because to do so would have required the city to institute charges on their existing free parking lots.

Some of the first bond resolutions adopted had provisions which permitted rate reductions only under certain rigidly specified conditions. Such a restriction has interfered with the adjustment of parking rates of new facilities to local competitive factors. More recently these restrictions have been removed. The Beverly Hills bonds, most recently sold, do not contain any restriction against competition or any restriction against changing rates as long as 1.50 coverage is maintained.

A city selling revenue bonds appears definitely committed to maintaining parking meters on its streets for as long as bonds are outstanding except where meters are removed to facilitate traffic movement. The right to eliminate meters for safety and to move traffic efficiently is not interfered with.

In general, cities are required to continue to operate their off-street parking facilities as long as bonds are outstanding. In Beverly Hills, however, the city is permitted to sell all or part of the revenue bond project and devote the proceeds to other off-street parking facilities or to the call of bonds. The city is required only to show that the required 1.50 coverage will be maintained after sale of the parking facilities. Other cities have similar provisions relating only to property taken by condemnation.

Some of these bond issues have included an amount for payment of interest during construction but this has not generally been found necessary. Because on-street revenues constitute a major part of the total revenue pledged to bond security, income from this source can be used to pay interest while off-street parking usage is developing.

Sale of Revenue Bonds

These parking revenue bonds, as with almost all California municipal bonds, have been sold at public sale. There have been no negotiated sales and no sales of bonds for less than par, although Sacramento Series B was not sold to underwriters. Comprehensive

prospectuses describing the bonds and their security were sent to prospective bond buyers in each case.

Generalizing on interest rates is extremely difficult since market conditions change between sales and also because the terms and conditions differ between issues. Net interest rates on California parking revenue bonds have ranged from 2.77 percent to 5.40 percent. In general, net interest rates have been less than one percent higher than comparable city general obligation bonds could have been expected to bear.

The following tabulation summarizes the net interest rates for which the six largest parking revenue bond issues were sold. Also shown is *The Bond Buyer*'s average of municipal bond yields. This average is presented as an indication of general municipal bond prices. Although not compiled to show this, it can be considered to represent the rate which would be paid for very high quality general obligation bonds offered for sale at this time.

NET INTEREST RATES ON ISSUES OVER $750,000

Date		*Amount*	*Net Interest Rate*	*The Bond Buyer Average*
7/24/51	Sacramento "A"	$1,600,000	3.19%	2.10%
12/ 7/54	San Jose	2,450,000	2.77	2.33
12/ 6/55	Bakersfield	880,000	3.09	2.52
7/ 6/56	Sacramento "B"	1,400,000	3.65*	2.61
2/19/57	Berkeley "B"	800,000	4.64	3.03
10/29/57	Beverly Hills	1,500,000	4.59	3.43

* Sold to city employees retirement fund.

These parking revenue bonds are exempt from state and federal income taxes, as are all California municipal bonds. Banks are not permitted to underwrite these bonds but do buy them for their accounts. Parking revenue bond issues have not been large enough to meet the qualifications established for legal investments for savings banks since annual gross revenues of $1,000,000 or more are required. Some national bond rating agencies still do not assign ratings to parking revenue bonds in the belief that there has been too little experience with this type of obligation.

Parking revenue bonds have not been as well received in the market as water or sewer revenue bonds because investors have considered water bills a better source of security than parking meter

charges. Also, water systems are less subject to free competition than are parking systems.

Investor confidence in parking revenue bonds has been increasing as the result of more than six years of experience in this state. Investors are selective, however, in evaluating parking revenue bonds, requiring coverage ratios of 1.50 or more. The revenue bond method of financing is frequently not applicable because of this fairly strict revenue requirement. Careful analysis of financial feasibility is required before revenue bonds are offered for sale.

California cities have had no difficulty paying bond interest and principal when due although nearly all cities have had to use some on-street meter revenue for this purpose. Basic confidence in downtown districts and the additional guarantees provided in the bond covenants appear to have eliminated the speculative character of parking revenue bonds.

Professional Advisers

Cities selling parking revenue bonds have found it desirable to employ competent and resourceful advisers. In every case cities have engaged special bond counsel to draw up the legal proceedings and to render approving opinions on the bonds. In almost all cases consulting engineers and financing consultants were employed. Effective co-operation among these three professional advisers has been essential to the success of any of these parking programs.

Engineers have been employed in the selection of sites and have made recommendations as to the method of operation and the rate schedules. Estimates of revenues, as prepared by consulting engineers, have been used to establish expected future revenue levels and have thus been relied upon by the bond buyers. The importance of the engineer's estimates is largely dependent upon the extent to which revenues from new facilities will be relied upon to maintain the guaranteed minimum coverage. As pointed out above, most of these revenue bond issues have relied primarily on existing on-street meter revenues, thus making the engineer's estimate relatively less important.

In San Jose, it was necessary to rely in part on estimated future off-street revenues to maintain the required 1.5 times coverage. To

help assure the most favorable possible sale of bonds, the city had two different consulting engineers submit independent estimates of future off-street parking revenues for use in connection with the sale of the bonds.

In Beverly Hills the parking program was based on extensive studies by consulting engineers. The engineers' estimates of future off-street parking revenues were not particularly critical as far as the sale of the bonds was concerned, however, since more than eighty-five percent of pledged revenues are expected to be derived from on-street parking meters, and on-street meters alone provide coverage of more than two-and-a-half times annual bond service.

Many of the functions performed by consulting engineers are necessary regardless of the financing method used. Careful preparation of revenue estimates is required by this financing method, and engineers generally have been very conservative in presenting these estimates on which investors must place considerable reliance.

The financing consultant investigates the financial feasibility of a proposed project and prepares the detailed financing plan under which bonds are to be issued. Carefully set up terms and conditions for the bonds, appropriately adjusted to the revenue producing ability of the parking enterprise, should result in a city's being able to sell its bonds at the most favorable possible interest rate and still to retain flexibility in its financial operations.

Other outside assistance has frequently been sought in property appraisal and negotiations and in condemnation proceedings. These services are likely to be required with other financing methods and are not particularly characteristic of revenue bond financing.

Summary

The experience of California cities with off-street parking revenue bonds indicates that this method will continue to be used in the future. Some of the cities which have already sold bonds can be expected to issue additional series, and new cities are expected to adopt this method.

The revenue bond method appears well suited in instances where the following conditions exist.

1. Willingness to use on-street parking revenue for off-street

parking purposes without insisting on direct financial participation by property owners in public off-street parking.

2. A desire to solve an overall city parking problem with a single financing method.

3. On-street meter revenues are substantial and capable of supporting a substantial bond issue without any off-street income.

The system concept in off-street parking is well established and it is likely that all future issues will continue to rely heavily on on-street meter income.

Careful planning is necessary to complete a revenue bond project. Several California cities now have projects in the planning stage. Use of revenue bonds for off-street parking can be expected in the future where parking income is sufficient and where other conditions permit use of this method.

Traffic: The Market Indicator

R. B. ATWATER

Mr. Atwater is a vice president and the General Manager of Traffic and Trade, Inc. He has spent more than twenty years in studying the relationship of traffic to retail trade, and to those forms of advertising that depend on moving traffic—outdoor advertising and window display. His work has taken him to all parts of the United States and Canada, and to much of the West Indies, Central and South America.

RETAIL markets are changing for every business, in both size and structure. Before the last War, the people who created a city's retail trade nearly all lived inside the city limits. Most retail businesses estimated their sales-potentials in relation to the city's population. The city limits contained the "market."

Since that time, city populations have exploded outward into their counties and beyond, with no regard for static civil boundaries. They have built new suburbs and absorbed old towns once isolated and self-sufficient – and they are still expanding.

Today, people inside the city limits are only part of the group who create the retail trade, often less than half. The market includes them all, inside and outside the city. Sales-potentials must be estimated on a new, constantly changing base, much more complex than the census statistics of city-limit populations.

Evidence of these changes is given by Samuel C. McMillan in an excellent analysis of retail sales in the central business districts of twenty-four major cities.[1] Professor McMillan clearly shows how retail trade has been moving outward from the old city centers since 1948, an obvious result of expanding populations.

The outward trend is by no means uniform in all cities. It is more advanced in the group of largest cities, those having standard metropolitan areas of a million or more population. In the smaller cities it is much less marked, both because the rate of outward movement is less, and because their central business districts had a larger proportion of the market trade at the starting point in 1948.

Professor McMillan's twenty-four selected cities and markets

1. "The Changing Position of Retail Trade in Central Business Districts," by Samuel C. McMillan, published in the *Traffic Quarterly*, July, 1957. The Eno Foundation, Saugatuck, Connecticut.

illustrate these differences. In Table I, they are grouped by size of 1954 market population, more than a million, and less than a million.

Table I

PERCENT DISTRIBUTION OF RETAIL TRADE, 1954 AND 1948
IN SUBDIVISIONS OF 24 STANDARD METROPOLITAN AREAS

		Standard Metropolitan Area	*Central Business District*	*City*	*Rest of Area*
In 24 areas	1954	100.0%	15.0	59.0	41.0
	1948	100.0%	20.0	64.6	35.4
In 13 areas, 1 million and over	1954	100.0%	13.2	55.3	44.7
	1948	100.0%	17.7	61.6	38.4
In 11 areas, 600,000 to 1 million	1954	100.0%	25.1	79.6	20.4
	1948	100.0%	31.4	81.5	18.5

SOURCE: "The Changing Position of Retail Trade in Central Business Districts," Samuel C. McMillan, *Traffic Quarterly*, July, 1957.

In the group of smaller markets, the central business districts in 1954 handled 25.1 percent of the area trade, as compared to only 13.2 percent handled by the centers of the large markets. The smaller cities still enjoyed four-fifths of total market trade, with relatively little change from their 1948 share, while the large cities dropped to 55.3 percent in 1954 from 61.6 percent, a loss of 10 percent.

It seems that the larger the city and market, the wider the dispersal of trade outlets over the market area.

Population in the two groups of areas does not follow the same pattern of distribution. Table II compares the distribution of people with that of retail trade in the two groups in 1954, inside city limits, and in the rest of the areas.

Table II

COMPARISON OF DISTRIBUTION PATTERNS – POPULATION AND RETAIL TRADE, 1954
IN SUBDIVISIONS OF 24 STANDARD METROPOLITAN AREAS

		Standard Metropolitan Areas	*City Limits*	*Rest of Area*
In 24 areas	Population	100.0%	51.5	48.5
	Ret. Trade	100.0%	59.0	41.0
In 13 areas, 1 million and over	Population	100.0%	48.8	51.2
	Ret. Trade	100.0%	55.3	44.7
In 11 areas, 600,000 to 1 million	Population	100.0%	67.0	33.0
	Ret. Trade	100.0%	79.6	20.4

Even the big cities handled a larger proportion of area-trade than they had of area-population. The smaller cities, with 67 percent of the area-population, handled 79.6 percent of the retail trade. It is obvious that outlying residents do a good deal of their shopping inside the cities. It follows that an even greater volume of travel must occur between the outlying parts of the areas and their central cities, because where people go to shop, they also go more frequently for other purposes. Their volume of travel is one of the criteria of market relationship used by the Bureau of the Census in defining Standard Metropolitan Areas.

This article will demonstrate that the volume and origin of travel to a city, or traffic, is a measure of the extent of the city's market influence; that the volume of traffic originating in any part of the market area directly expresses degree of market relationship; and, finally, that the volume of market-traffic at a particular site and convenience of travel to the site are a practical basis for appraising the retail trade potential, or the value for other land-uses.

A New Market Dimension

Markets are changing because more and more people are settling in the fringe-areas outside central cities. Nearly all the population increase of the last decade has appeared in the outlying parts of 168 Standard Metropolitan Areas. The indications are that the same thing is happening in proportionate degree to many smaller cities.

Sales Management, in its 1957 "Survey of Buying Power," estimates 66 percent of the country's population to be in 262 metropolitan county areas, among which the smallest central cities have populations in the 30,000 to 40,000 bracket. It is probable that the trend will continue into the future. But today, its effect is to complicate the evaluation of retail markets.

It has been shown that this outward shift in the distribution of population has not dissociated the people from their central city. On the contrary, it seems that they move outside the city only as far as the limit of convenient, daily travel-time to and from the city.

The daily time-schedule of community activities has changed very little; it is still encompassed by the daylight period. But the distances people can travel on the same fixed time-schedule are

increasing every year. The automobile is the cause, with its growing use as family transportation. Faster cars, better traffic facilities and controls are constantly pushing outward the home-zones from which people can drive out on the daily routine and get home comfortably for supper.

Travel-time by automobile is the new dimension in the size and shape of our changing markets. The time it takes to go to work, or to school, or shopping, determines the increasingly variable quantity of distance from these routine destinations. New suburbs, shopping centers, factories, businesses, all must be located within convenient travel-time.

The influence of travel-time on community structure is clearly apparent where a new, high-speed freeway passes through, or near, a city. Population shifts outward along its axis, land-use is upgraded, and open areas fill up. The market's periphery bulges outward through the concentric mileage circles centered on city hall, which used to describe the range of urban influence. The freeway has reduced travel-time.

1935 Study of Traffic and Trade

A study[2] published in 1935 first established the basic principles of relationship between the flow of traffic in a market and its retail trade.

Of three important findings, the first was that traffic flow and retail trade follow parallel patterns of distribution, in space and in time. From this principle the study concluded and demonstrated that traffic flow can be used as a basis for appraising the trade potentials of various retail commodities, and for comparatively checking the sales-efficiency of outlets.

The second finding was that traffic flow divides between markets, at points recognizable on major arteries by the leveling-out of the volume of flow. The study concluded and demonstrated that the area within a city's retail-trading influence can be delimited by locating, first, the points of stabilization near the fringe of the urbanized area; and second, the dividing low points where traffic flow toward another market begins to build up.

The third important result was a confirmation of earlier studies

2. "Traffic and Trade" by Paver and McClintock.

which found that the hourly distribution of urban traffic flow follows so consistent a pattern that sample-counts made during certain hours are a basis for reasonably accurate estimation of the day's total traffic volume. This fact made possible the practical application of the first two findings.

Study-Principles Applied Today

In spite of rapid and extensive changes in the size and structure of markets, the principles established in 1935 are essentially sound today. In fact, the basic relationships found there tend to become stronger and more easily measurable, as automobile travel increasingly predominates in the daily movements of market-residents.

The simple, objective definition of retail market formulated then is even more accurate today. The market is "effective demand," the dollar-volume of personal expenditures, by residents of the area within which daily travel is oriented toward the central city. Thus, the easiest way to determine the extent of a market, and, indeed, of a community, is to measure its pattern of traffic movement.

The reason is that people travel more often and in greater numbers to the city which is their market – or community-center – than to other cities. Their daily travel to the center follows a pattern so consistent in time- and space-distribution, that the traffic itself indicates what center attracts the most people from outlying areas and towns. The *traffic* indicates market-relationship.

No market relationship is absolute: all people go everywhere to some degree, especially car-owners. On the fringes of a city's area of market influence, travel to the city is less frequent and in smaller volume, in measurable relation to greater distance, or travel-time. Larger proportions of these fringe populations go to other cities, or centers. But it is still easily practical, by analyzing the traffic pattern, to draw a line around the areas, and the population groups, from which travel to a given center is greater and more frequent than to any other center.

The procedure is based on the principle stated in the "Traffic and Trade" study of 1935 – that traffic flow divides between competing markets at discernible points.

Simpler and less costly methods have been developed to determine areas of market influence by study of directly related traffic

movements. The origin of automobiles in daily traffic in the central city is traced to home-zones. Comparison of the number of cars that appear in the city from a particular zone or place, with the number registered in the zone, establishes the degree of market-relationship. In general, it has been found that ten percent of a place's registered cars moving in central-city daily traffic represents the minimum of effective relationship. A line drawn through the ten percent car-origin points surrounding the city pretty well encloses the market area.

As might be expected, the proportional origin of market-cars follows a distinct and characteristic pattern – also quite consistent from market to market. Cars from the nearest places appear in city traffic in the highest proportions of home registration.

Table III shows a typical pattern of the market relationship to Pittsfield, Massachusetts, of surrounding towns in Berkshire and Hampshire Counties. (See page 292.)

The proportions of cars from the market towns show how the city's attraction diminishes as travel-time and distances increase. Cars from the "inner ring" of towns travel in Pittsfield almost as much as city cars do.

The Market's Trade Potential

The reason for defining the market area is to fix the market's overall trade-potential, and the individual potentials of the component towns, based on the measured travel-relationships. It is then possible to establish the distribution of retail purchases by market residents in the city and other sales centers. This was done for service station purchases, as follows:

Table IV

PERCENTAGE DISTRIBUTION OF PURCHASES OF STATION PRODUCTS BY RESIDENTS OF THE PITTSFIELD MARKET

		Purchases Made		
By People From	*Total*	*In Pittsfield*	*In Rest of Market*	*Outside Market*
Pittsfield	100.0%	73.3	13.7	13.0
Inner Ring Towns	100.0%	41.4	45.6	13.0
Outer Ring Towns	100.0%	6.3	80.7	13.0
Total	100.0%	37.4	49.6	13.0

Table III

THE PITTSFIELD MARKET AREA DEFINED BY TRAFFIC ORIGIN

Towns from which a minimum of 10 percent of registered cars appeared in 18-hour traffic at seven selected counting stations in Pittsfield, June, 1956

Town of origin	*1955 Car Registration*	*Number of different cars recorded*	*Percent of Registration*
Inner Ring—			
Pittsfield City	14,439	13,180	91.3%
Cheshire	566	310	54.8
Dalton	1,621	1,365	84.2
Hinsdale	415	380	91.6
Lanesboro	792	665	84.0
Lenox	1,182	800	67.7
Peru	57	40	70.2
Richmond	339	160	47.2
Windsor	143	135	94.4
Outer Ring—			
Adams	3,110	620	20.0
Alford	98	20	20.4
Becket	264	110	41.7
Egremont	320	55	17.2
Florida	151	15	9.9
Great Barrington	2,187	345	15.8
Hancock	151	50	33.1
Lee	1,357	435	32.1
Monterey	181	30	16.6
New Ashford	41	15	36.6
New Marlboro	415	40	9.6
North Adams	5,429	540	9.9
Savoy	113	25	22.1
Sheffield	735	110	15.0
Stockbridge	1,056	230	21.8
Washington	94	20	21.3
W. Stockbridge	532	115	21.6
*Mt. Washington	—	—	—
**Total in Berkshire County	35,798	19,810	55.3%
In Hampshire County			
Cummington	206	60	29.1%
Middlefield	87	25	28.7
Plainfield	91	15	16.5
Worthington	147	50	34.0
Total Pittsfield Market	36,329	19,960	54.8%

* Included because of situation.

** Not included are Clarksburg, Otis, Sandsfield and Williamstown, the rest of Berkshire County.

SOURCE: "A Study of Traffic and Service Station Sales," Traffic and Trade, Inc., February, 1957.

These figures show how much of the total market trade came to Pittsfield's service stations, how much escaped, and where it went. They also evaluate the "pull" exerted by Pittsfield stations on the rest of the market.

Sales-Efficiency of Individual Outlets

The next step was to determine whether individual service stations were making the most of the sales-opportunity offered by the traffic passing by.

It was found, in general, that the origin-pattern of traffic passing Pittsfield stations was much the same as the origin-pattern of customers who entered the stations; even the distribution of gallons of gas sold followed a similar pattern, as shown in Table V:

Table V

COMPARISON OF PROPORTIONS OF PASSING TRAFFIC FROM PARTS OF THE MARKET AREA AND OUTSIDE, WITH PROPORTIONS OF GAS SOLD TO CUSTOMERS FROM PARTS OF THE MARKET AREA AND OUTSIDE

	Percent of Cars and Light Trucks		
Origin of traffic and customers	*In passing traffic*	*Entering stations*	*Percent of gas sales in gallons*
Pittsfield City	62.6	64.3	63.4
Inner Ring Towns	11.8	11.8	12.7
Outer Ring Towns	8.8	7.1	6.6
Rest of State	8.5	10.3	8.0
Out of State	8.3	6.5	9.3
	100.0%	100.0%	100.0%

Then, by knowing the total gas sold in Pittsfield, or the demand, and the total number of operating stations, or the supply; and by knowing the volume and origin-composition of the daily traffic at all stations, sales-performances factors were computed. These factors indicated the annual gallonage potential per 1,000 vehicles of each origin-classification in Pittsfield's daily traffic. When applied to the traffic passing any station in Pittsfield, the factors produced accurate estimates of the gallonage a station could reach, given average management and equipment. Or, the potential at a new station could be rated.

The additional data needed for each estimate were a short-count and classification record of the daily traffic passing the site to be rated, adjusted for seasonal variation.

Coverage: How Many Stations?

A service station intercepts most of its trade; that is, most customers are people who pass the station on the way to another destination. Convenient opportunity to buy is paramount. Therefore, in general, the station that people pass most often, gets their business.

Daily traffic at any point on a major street includes an appreciable proportion of repeated passages by people driving back and forth. At a series of points on different streets taken as a group, the proportion of repeated passages increases to added degree by repeated passages from point to point in the group.

This characteristic of traffic is extremely important to retail businesses, especially to those having a series of outlets in the same market area. It is especially important to gas stations and other outlets of convenience goods, which depend on intercepting their customers. The question is, first, how many *different* people are in the traffic passing an outlet; and, second, how many of these have already passed other outlets – in the same company, or in a competitive system?

The following Table VI shows how many potential customers were repeatedly exposed to a group of company stations in Pittsfield.

Table VI

CUMULATIVE TOTALS OF CITY CAR TRIPS AND OF DIFFERENT CARS IN THE DAILY TRAFFIC PASSING SIX COMPANY SERVICE STATIONS

	City Car Traffic		*Percent of Total*	
Number of stations	*Total trips*	*Different cars*	*Total trips*	*Different cars*
At 1	8,448	5,016	18.1	37.6%
2	19,884	9,942	42.6	74.5
3	29,628	11,392	63.4	85.4
4	38,760	12,113	83.0	90.7
5	45,024	13,242	96.4	99.2
6	46,716	13,347	100.0%	100.0%

The total of 46,716 trips by Pittsfield city cars passing six service stations during a day was generated by 13,347 different cars passing and repassing the stations. Only 29 percent of the total cars were potential customers at the group of stations.

Another interesting fact is that the total traffic that passed four stations included 90.7 percent of all the different cars that passed the whole group of six stations. The inference is that, perhaps, four or five stations would do as good a job as six.

Traffic Shapes the Community

The Pittsfield study, briefly described, demonstrates that the retail market is closely related to the movement of traffic. In fact, since all customers are traffic, it can be said that the retail market *is* traffic.

Traffic is the consistent link between the homes and every other land use in a community, in addition to retail trade. Traffic marks the extent and degree of integration of the social and economic system. The community makes traffic, and traffic forms the community, by measurable and predictable pattern.

It would seem that market analysis, city planning, and traffic engineering are all links of the same community chain.

Provisional Operator's License Law Adopted in Connecticut

ROBERT I. CATLIN

Mr. Catlin, one of the originators of the Connecticut Safety Commission in 1935, has served as Chairman since 1947. From 1932–1936, he was Vice President for Public Safety of the National Safety Council. Mr. Catlin retired August 1, 1956 as Vice President of the Aetna Casualty and Surety Company after thirty-nine years of service, and is currently serving as consultant to the Center for Safety Education of New York University.

OCTOBER 1, 1957, might well be a day of marked progress in the field of driver-licensing. On that date, Connecticut became the first state to establish the principle of requiring all new operators under twenty-one years of age to justify their right to an unrestricted driver license by maintaining a satisfactory record while on probation.

Heretofore, practically every boy and girl arriving at the age of sixteen correctly assumed they should be granted the privilege of operating an automobile, provided they had the necessary fee and could pass the ordinary driver's test.

Without suitable experience or training, they were entitled to the privilege to drive on the same provisions required of an adult.

With the adoption of the Provisional License Law, Connecticut provides that all operators under twenty-one licensed in the future "remain on probation until reaching the age of twenty-one; that possibility of receiving a full-fledged operator's license will depend upon the record established with the Motor Vehicle Department while carrying a provisional license."

This law establishes a new and important principle in driver-licensing. The psychological effect on new operators under twenty-one should be most beneficial.

While the principle of justifying an unrestricted operator's license should apply to all new operators regardless of age, the Connecticut legislature limited the application of the new law to new operators under twenty-one years.

Considering that more than ninety percent of all new operators licensed in Connecticut are under twenty-one years of age, it can readily be understood why the new law was set up with these conditions.

In considering the justification for issuing provisional licenses to new operators under twenty-one, the following information – based upon data prepared by the motor vehicle department for the period from July 1, 1955, to June 30, 1956 – is significant:

A. Of Connecticut's 1,100,000 licensed operators, 73,151 or 6.5 percent were under twenty-one; of these 47,836, or 65 percent were males, and 25,315 or 35 percent, females.

B. Of the 33,599 accidents reported to the motor vehicle department, 6,632 or 20 percent involved operators under twenty-one.

C. Of the 89,680 arrests for motor vehicle violations, 12,379 or 14 percent involved operators under twenty-one.

D. Of the 6,632 accidents involving operators under twenty-one, 85 percent involved males; 15 percent, females.

E. Of the 12,379 arrests involving operators under twenty-one, 95 percent involved males; 5 percent, females.

These figures clearly demonstrate the necessity for further training and experience of operators under twenty-one years, as well as a more healthy attitude toward the privileges associated with an operator's license.

Connecticut issues approximately 100,000 new operator licenses each year. Accordingly, during 1958, approximately 90,000 new licenses will be issued to operators under twenty-one on a provisional basis. Assuming the Connecticut Motor Vehicle Department continues to issue at least 90,000 provisional licenses each year for several years, one can readily see that in a few years at least 250,000 persons will be driving automobiles in Connecticut on probation.

What the New Law Includes

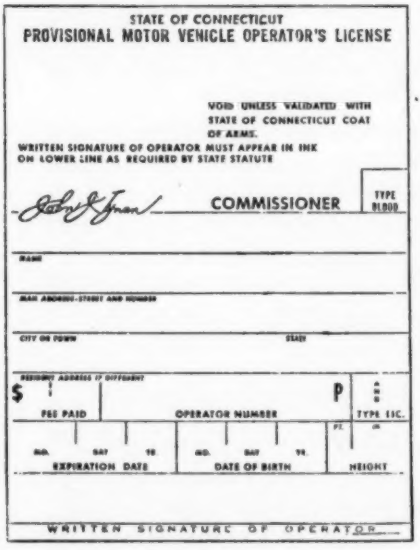
While it is too early to predict the full effect of such a change, it is reasonable to assume there will be much greater evidence of respect for an operator's license than at present. This result is vitally important: many observers believe one of the principal reasons for the serious traffic-accident situation confronting the country is the

unhealthy attitude of many operators. If this be true, then introducing the principle of "earning" a license as provided for in a provisional license should result in a marked betterment of driver attitude.

Section 1 of the new Provisional License Law reads as follows:

"Section 1. As used in this act, provisional operator's license means one issued by the commissioner of motor vehicles to any person under the age of twenty-one who has not been previously licensed to operate a motor vehicle in this state. Each provisional operator's license shall be clearly distinguishable, either in color or size, as determined by the commissioner, from other operator's licenses, shall be designated as a provisional operator's license and shall contain an admonition that the later procurement of a non-provisional license is conditional on the establishment of a record, satisfactory to the commission, showing compliance with the motor vehicle laws of this and other states."

While of the same size as a regular operator's license, the new provisional license is printed on a salmon colored card, whereas the regular license is on a light green card.


STATE OF CONNECTICUT
PROVISIONAL MOTOR VEHICLE OPERATOR'S LICENSE

VOID UNLESS VALIDATED WITH STATE OF CONNECTICUT COAT OF ARMS.

WRITTEN SIGNATURE OF OPERATOR MUST APPEAR IN INK ON LOWER LINE AS REQUIRED BY STATE STATUTE

COMMISSIONER

TYPE BLOOD

NAME

MAIL ADDRESS—STREET AND NUMBER

CITY OR TOWN STATE

RESIDENCE ADDRESS IF DIFFERENT

$ FEE PAID

OPERATOR NUMBER

P

TYPE LIC.

PT. IN

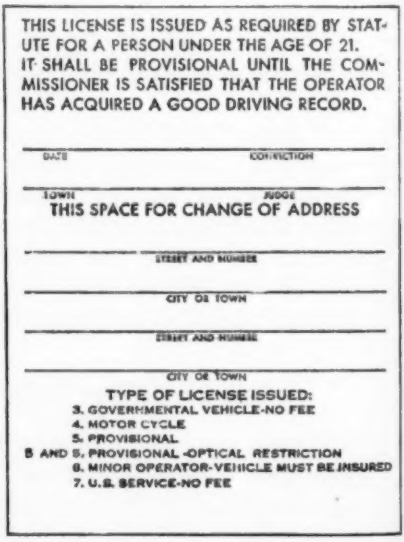
NO. DAY YR. EXPIRATION DATE

NO. DAY YR. DATE OF BIRTH

HEIGHT

WRITTEN SIGNATURE OF OPERATOR

Figure 1. Front of license card.


THIS LICENSE IS ISSUED AS REQUIRED BY STATUTE FOR A PERSON UNDER THE AGE OF 21. IT SHALL BE PROVISIONAL UNTIL THE COMMISSIONER IS SATISFIED THAT THE OPERATOR HAS ACQUIRED A GOOD DRIVING RECORD.

DATE CONVICTION

TOWN JUDGE

THIS SPACE FOR CHANGE OF ADDRESS

STREET AND NUMBER

CITY OR TOWN

STREET AND NUMBER

CITY OR TOWN

TYPE OF LICENSE ISSUED:

3. GOVERNMENTAL VEHICLE-NO FEE
4. MOTOR CYCLE
5. PROVISIONAL
5 AND 5. PROVISIONAL -OPTICAL RESTRICTION
6. MINOR OPERATOR-VEHICLE MUST BE INSURED
7. U.S. SERVICE-NO FEE

Figure 2. Reverse side of card.

The admonition required in the law, and which accompanies each provisional license when issued, is highly important as it places the licensed operator on definite notice as to what may happen if he does not prove to be a good and safe driver. This admonition reads as follows:

Section 3 of the new Provisional License Law provides: "Any person operating a motor vehicle under a provisional license who, in the opinion of the commissioner of motor vehicles, has violated any of the provisions of section 2407, 2408, 2410, or 2412, or any similar provisions of the laws of any other state or any territory, or who has been convicted of, or has forfeited any bond taken for appearance for, or has had his case nolled upon payment of any sum of money in connection with, or has received a suspended judgment or sentence for, a violation of any of said provisions, or a second violation within a twelve-month period of the provisions of sections 1382d to 1401d, inclusive, as amended, or who has been held or found criminally responsible in connection with any motor vehicle accident, resulting in the death of any person, or who has a record on file with the commissioner of motor vehicles which is sufficient in the opinion of said commissioner, to require revocation of such license, the commissioner *shall* revoke the provisional license issued to such person for the remainder of the term for which it was issued and suspend the right of any such person to operate a motor vehicle for such period as the commissioner determines, except that, for a second violation of the provisions of sections 1382d to 1401d, inclusive, as amended, the commissioner may, in his discretion, suspend such license or waive any suspension or revocation."

(NOTE: Section 2407 pertains to speeding. Section 2408 pertains to reckless driving. Section 2410 pertains to evading responsibility. Section 2412 pertains to operation while intoxicated. Section 1382d pertains to driving in the right hand lane and Section 1401d pertains to stopping at grade crossing. The others pertain to such items as passing on the right, no-passing zones, space between vehicles, turns, vehicle signals and right-of-way.)

The provision in Section 3 for revoking or suspending a provisional license can best be understood by keeping in mind:

1. Provisional licenses issued for the first time will run from the date of issue for a period of approximately two years, depending on month of birth of the operator. On renewal, the provisional license, like a regular license, will run for a full two years, expiring in the month of birth of the operator.

THIS CONCERNS YOU

If you are under twenty-one years of age, your license must be issued on a provisional basis until after your twenty-first birthday.

If you wish to qualify for a regular license, you must maintain a good driving record and obey the traffic laws of this state or any state you operate in.

If you are convicted for a motor vehicle offense or operate in a manner so as to endanger the safety of the public, your license must be revoked.

Safety on our highways is a matter of grave concern to all. It is your responsibility to justify continuance of your operating privilege.

Remember, safe driving can not only save your license, but also your life.

John J. Tynan

Figure 3. Card accompanying license.

2. Should cause for revoking a provisional license arise during the first few months after the provisional license was issued, the motor vehicle department would revoke the license for the remainder of the term for which it was issued. On the other hand, if cause for revocation should arise in the latter months of the life of the license, the motor vehicle department would not only revoke the license, but suspend the right to apply for a new provisional license for a period which, in the judgment of the motor vehicle commissioner, would be warranted. In other words, the duration of a suspension beyond the period of revocation is left to the discretion of the motor vehicle commissioner.

Commenting on Section 3, Commissioner Tynan states:

"Newly-licensed drivers under twenty-one face tougher license suspensions for motor vehicle violations under the new provisional license law. The holder of a provisional license must pay particular attention to driving laws or he will find himself in real trouble."

Connecticut adopted the so-called point system in 1947 – the first state to establish this plan for dealing with the individual operator on the basis of his driving record. The method of scoring and administering the plan is shown in the following chart:

Fatal accident	10 points
Operating under the influence	10 points
Evading responsibility	8 points
Racing	8 points
Operating under suspension	7 points
Reckless driving	6 points
Reckless driving, if no evidence of liquor, accident or speed	4 points
Speeding	3 points
Violation of rules of road	3 points
Passing standing school bus	2 points
Failure to stop at stop sign	2 points
All other convictions for moving violations	2 points
Police or Inspector's warnings	1 point
On proved complaint of moving violation	1 point
Accident involvement, no conviction	1 point

Action Taken: Accumulation of 3 points results in a warning letter; 5 points, in an official driver-conference; 7 points, in a hearing at which the driver's license is generally suspended.

Reference to the point system is made primarily to emphasize that penalties prescribed in the provisional license law are much more severe than under the point system. The main reason for this action is to impress operators under twenty-one, holding a provisional license, that they must be more cautious and co-operative in observing motor vehicle laws and regulations, lest they find themselves deprived of the privilege of driving an automobile for a long time. This is borne out in the admonition card issued by the motor vehicle commissioner with each new and renewal provisional license.

Under Section 4 of the Provisional License Law is specified the regulation for tying in the provisional requirement with the Connecticut plan for issuing operators' licenses on the birth-month basis:

> "Each original operator's license shall expire on the last day of the month in which the operator's next birthday occurs, and each provisional operator's license shall expire on the last day of the month in which the operator's next birthday but one occurs, at which time the operator shall be issued a renewal or non-provisional license for either one or two years depending upon his year of birth."

The motor vehicle department advises there will be no variance in the examinations for a provisional or a regular license. Furthermore, every effort will be made by examiners in the motor vehicle department to impress upon young persons being granted provisional licenses the extent to which their operating record is vitally important.

Improved Driving Records Sought

In order that the motor vehicle department can in time compare the record of holders of provisional licenses with that of operators under twenty-one who, prior to October 1, were driving with regular licenses, separate records will be maintained and studied from time to time. Naturally, it is hoped the effect of driving on probation will lead to a much improved record. If it does, the fundamental principles underlying the provisional license will have been proved sound.

The 1957 Connecticut legislature adopted another law concerning driver-education requirements of persons under eighteen years of age. This law coupled with the Provisional License Law, should materially strengthen licensing operation and create a deeper respect for the privilege of driving an automobile. This new law (Public Act 599 of 1957) provides in part:

> "On and after July 1, 1958, no license shall be issued to any person between sixteen and eighteen years of age unless the applicant presents to the commissioner a certificate of the successful completion of a course of study in motor vehicle operation, prepared as provided by section 1363 of the general statutes, or of training of similar nature approved by the commissioner."

When one analyzes the requirements for securing and holding an operator's license in other fields, such as air travel and railroads, it is evident that we have moved all too slowly in setting up proper standards for licensing motor vehicle operators. Such standards are not only justifiable but essential if the nation's number one problem – traffic safety – is to be solved.

To round out any program for better licensing and control of automobile operators, every state should adopt a sound and effective point system. Not only does this plan provide an incentive for safe driving; it offers a positive means of rehabilitating those with a tendency to get into trouble.

Furthermore, the point system, if properly administered, should serve to remove from the highways the driver who has demonstrated he is unfit to hold an operator's license. Such a system also offers the most practical and economical way of dealing with the re-examination of operators.

One wonders how some states can charge as little as twenty-five or fifty cents a year for an operator's license and do an efficient administrative job, when Connecticut and New Jersey charge $3 a year. Considering the many angles involved, it would appear essential to charge a sufficient fee to provide adequate funds to carry out an all-around program.

Admitting, as we must, that the driver of an automobile is the key to solving the traffic-accident problem, it behooves state officials to adopt, and without delay, measures that will produce better and more effective licensing procedures. Only by so doing can we anticipate with any degree of certainty a marked improvement in our traffic-accident situation.

It is becoming increasingly evident that, unless the states do a more effective job in solving the traffic-accident problem, the federal government will assume the same control over private passenger cars traveling inter-state that it has over commercial cars.

Connecticut has demonstrated, by adopting the Provisional License Law and the Driver Education Requirement Law, a lead that might well be emulated by other states.